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

SINGLE PLA CONTRACT VERSION

TABLE OF CONTENTS

Introduction 2
Bid Submission Requirements 3
Notices to Bidders 4
- Project Labor Agreement & Single Contract 4
- Pre Bid Questions (PBQs) 4
- NYC Contract Financing Loan Fund 4

M/WBE Notice to Prospective Contractors 5
Affirmation 13
Pre-Award Process 15
Project References 17
- A. Contracts completed by the bidder 17
- B. Contracts currently under construction by the bidder 18
- C. Pending contracts not yet started by the bidder 19

Introduction

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

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

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

Bid Submission Requirements

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

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

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

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

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

Notices to Bidders

Project Labor Agreement & Single Contract

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

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

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

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

Pre Bid Questions (PBQs)

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

NYC Contract Financing Loan Fund

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

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

M/WBE Notice to Prospective Contractors

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

ARTICLE I. M/WBE PROGRAM

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

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

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

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

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

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

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

PART A

PARTICIPATION GOALS FOR CONSTRUCTION, STANDARD

AND PROFESSIONAL SERVICES CONTRACTS OR TASK ORDERS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PART B

MISCELLANEOUS

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

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

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

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

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

ARTICLE II. ENFORCEMENT

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

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

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

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

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

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

(d) terminating the Contract;

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

(f) withholding payment or reimbursement;

(g) determining not to renew the Contract;

(h) assessing actual and consequential damages;

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

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

(k) taking any other appropriate remedy.

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

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

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

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

Affirmation

The Bidder affirms and declares:

1. The said bidder is of lawful age and the only one interested in this bid; and no person, firm or corporation other than hereinbefore named has any interest in this bid, or in the Contract proposed to be taken.
2. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief: (1) the prices in this bid have been arrived at independently without collusion, consultation, communication or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor; (2) unless otherwise required by law, the prices quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and (3) no attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.
3. No councilman or other officer or employee or person whose salary is payable in whole or in part from the City Treasury is directly or indirectly interested in this bid, or in the supplies, materials, equipment, work or labor to which it relates, or in any of the profits thereof.
4. The bidder is not in arrears to the City of New York upon debt or contract or taxes, and is not a defaulter, as surety or otherwise, upon any obligation of the City of New York, and has not been declared not responsible, or disqualified, by any agency of the City of New York or State of New York, nor is there any proceeding pending relating to the responsibility or qualification of the bidder to receive public contracts except as disclosed in PASSPort.
5. The bidder hereby affirms that is has paid all applicable City income, excise and other taxes for all it has conducted business activities in New York City.
6. The bidder, as an individual, or as a member, partner, director or officer of the bidder, if the same be a firm, partnership or corporation, executes this document expressly warranting and representing that should this bid be accepted by the City and the Contract awarded to him, he and his subcontractors engaged in the performance:

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

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

7. Compliance Report

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

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

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

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

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

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

    I hereby:

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

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

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

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

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

Pre-Award Process

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

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

****

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

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

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

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

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

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

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

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

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

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

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

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

(5) List of key material suppliers.

(6) Preliminary bar chart time schedule

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

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

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

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

CONTRACTOR'S DETAILED SCHEDULE OF VALUE BREAKDOWN

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
			DIVISION 01 - GENERAL REQUIREMENTS												
							DIVISION 01 - GENERAL REQUIREMENTS EXCLUDING the following 6 items: 1) 01 50 00; 3.4-Temporary Electrical Service. 2) 01 50 00; 3.5-Temporary Heat. 3) 01 50 00; 3.8-Field Office. 4) 01 50 00; 3.14-Rodent and Insect Control. 5) 01 50 00; 3.18-Security Guards. 6) 01 54 23; 1.9-Sidewalk Sheds. **These 6 items must be filled out separately on the Bid Submission Form and PASSPort Item Grid.**								
1		Z10		01 30 00 Administrative Requirements			Administrative Requirements	1.00	LS	$ 80,000.00	$ 2,300,000.00		$ 2,380,000.00	$ 2,380,000.00	
2		Z10		01 40 00 Quality Requirements			Quality Requirements	1.00	LS	$ 250,000.00	$ 100,365.00	$ 50,000.00	$ 400,365.00	$ 400,365.00	
3		Z10		01 50 00 Temporary Facilities and Controls			Temporary Facilities And Controls	1.00	LS	$ 225,000.00	$ 400,000.00	$ 75,000.00	$ 700,000.00	$ 700,000.00	
		Z10		01 60 00 Product Requirements			Product Requirements	N/A						N/A	
4		Z10		01 70 00 Execution and Closeout Requirements			Execution And Closeout Requirements	1.00	LS		$ 155,000.00		$ 155,000.00	$ 155,000.00	
		Z10		01 90 00 Life Cycle Activities			Life Cycle Activities	N/A						N/A	
		Z10		01 41 23 Fees			License Fees	N/A						N/A	
5		Z70		01 41 26 Permit Requirements			Permit Costs	1.00	LS	$ 128,500.00			$ 128,500.00	$ 128,500.00	
6		Z70		01 78 33 Bonds			Bond Fees	1.00	LS	$ 470,996.00			$ 470,996.00	$ 470,996.00	
7		Z70		00 73 16 Insurance Requirements			Insurance	1.00	LS	$ 2,144,000.00			$ 2,144,000.00	$ 2,144,000.00	
8		Z90		01 41 23 Fees			Fee & Contingencies	1.00	LS	$ 2,720,000.00			$ 2,720,000.00	$ 2,720,000.00	
			copy above cell and insert copied cell above the row												
							DIVISION 01 - GENERAL REQUIREMENTS SUB TOTAL			**$ 6,018,496.00**	**$ 2,955,365.00**	**$ 125,000.00**		**$ 9,098,861.00**	
			DIVISION 02 - EXISTING CONDITIONS												
		F30		02 41 19 Selective Demolition											
							Remove stone steps & landings, dispose - w/sitework (INCLUDING DIV. 32)							W/ Div 32	
							Remove concrete retaining walls w/foundations, dispose ((INCLUDING DIV. 03)							W/ Div 32	
			copy above cell and insert copied cell above the row												
							DIVISION 02 - EXISTING CONDITIONS SUB TOTAL								
			DIVISION 03 - CONCRETE												
9		A40		03 30 00 Cast-in-Place Concrete				1.00	LS	$ 772,500.00	$ 1,590,000.00	$ 260,859.00	$ 2,623,359.00	$ 2,623,359.00	
							Pile Cap PC1 - 2'6" wide x 2'6" length x 2'6" deep - 28 ea							Incl. Above	
							Pile cap PC2 - 6'6" wide x 3'6" length x 3'0" deep - 3 ea							Incl. Above	
							Pile Cap PC3 6'6" wide x 6'6" length x 3'0" deep - 3 ea							Incl. Above	
							Concrete pier P1 - 24" wide x 24" width x 15'0" deep							Incl. Above	
							Concrete pier P2 - 24" wide x 36" width x 15'0" deep							Incl. Above	
							Concrete pier P3 - 18" wide x 18" width x 10'0" deep							Incl. Above	
							Concrete pier P4 - 20" wide x 27" width x 8'5" deep							Incl. Above	
							Concrete pier P5 - 20" wide x 24" width x 11'0" deep							Incl. Above	
							Concrete pier P6 - 28" wide x 29" width x 10'0" deep							Incl. Above	
							Concrete pier P7 - 20" wide x 25" width x 8'5" deep							Incl. Above	
							Concrete pier P8 - 27" wide x 28" width x 8'5" deep							Incl. Above	
							Concrete pier P9 - 23" wide x 20" width x 10'0" deep							Incl. Above	
							Concrete pier P10 - 23" wide x 20" width x 10'0" deep							Incl. Above	
							Concrete pier P11 - 24" wide x 31" width x 14'0" deep							Incl. Above	
							Concrete pier P12 - 27 1/2" wide x 30 5/8" width x 14'0" deep							Incl. Above	
							Concrete wall footing WF1 -3'0" wide x 3'0" length x 2'0" deep							Incl. Above	
							Grade Beam GB1 - 2'6" wide x 2'6" deep							Incl. Above	
							Grade Beam GB2 - 1'6" wide x 2'6" deep							Incl. Above	
							Grade Beam GB3 - 3'0" wide x 3'6" deep							Incl. Above	
							Grade Beam - 2" thk compressible fill under grade beams - FO-302							Incl. Above	
							Concrete footing F1 - 3'0"x 3'0"x 2'0" deep							Incl. Above	
							Concrete footings at rock-liner walls (1 side), 3'-0" wide x 2'0" deep, bst - w/above							Incl. Above	
							Concrete slab M24 - 24" deep at cellar							Incl. Above	
							Concrete slab on grade S12 - 12" deep, 2 way							Incl. Above	
							Concrete slab on grade S12 - 12" deep, structural slab over basement							Incl. Above	
							Concrete slab on grade, 5" thick, 2 way							Incl. Above	
							Concrete slab S7 - 7" deep							Incl. Above	
							Stepping slab/wall etc - allow							Incl. Above	
							Gravel layer at building slab on grade, 12"th							Incl. Above	
							Gravel layer at building foundation wall - F0-301							Incl. Above	
							Concrete curb at curtain wall in gymnasium and lobby							Incl. Above	
							Concrete elevator sump pit							Incl. Above	
							Concrete sewage ejector pit 4' x 4' x 6'							Incl. Above	
							Sleeve in slab for volleyball posts							Incl. Above	
							Perimeter drainage, 4" dia. perforated PVC piping at basement only							Incl. Above	
							Concrete wall W8							Incl. Above	
							Concrete wall W10 at elevator shaft & bldg							Incl. Above	
							Concrete wall W12							Incl. Above	
							Concrete wall W18							Incl. Above	

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
							Concrete wall W20							Incl. Above	
							Concrete wall W16.375							Incl. Above	
							Concrete housekeeping pads, curbs - allow							Incl. Above	
		B20		03 35 43 Polished Concrete Finishing											
							Polish concrete topping slab							Incl. Above	
		A20		03 41 00 Precast Structural Concrete											
10		A20					Pre-cast concrete panels with ribbed pattern at lobby reception desk (Includes 25 lf of concrete t	116.00	SF	$ 8,500.00	$ 3,500.00		$ 103.45	$ 12,000.00	
11		A20					Pre-cast lobby stair w/ architectural concrete treads & risers w/exposed bottom, 25 risers, 6'-10"	1.00	FLGH	$ 21,000.00	$ 11,500.00	$ 7,000.00	$ 39,500.00	$ 39,500.00	
														$ -	
			copy above cell and insert copied cell above the row												
							DIVISION 03 - CONCRETE SUB TOTAL			**$ 802,000.00**	**$ 1,605,000.00**	**$ 267,859.00**		**$ 2,674,859.00**	
			DIVISION 04 - MASONRY												
		B20		04 01 10 Masonry Cleaning										W/ 042000	
							04 01 10 Masonry Cleaning	1.00	EA				$ -		
12		B20		04 20 00 Unit Masonry				1.00	LS	$ 993,383.00	$ 2,350,000.00	$ 350,000.00	$ 3,693,383.00	$ 3,693,383.00	
							Type M2, 6" CMU wall							Incl. Above	
							Type M2R, 6" CMU wall, 1 hr fire rated							Incl. Above	
							Type M3, 8" CMU wall							Incl. Above	
							Type M3R, 8" CMU wall, 1 hr fire rated							Incl. Above	
							Type M4R, 8" CMU wall, 2 hr fire rated							Incl. Above	
							Masonry shear wall MSW8, grouted solid							Incl. Above	
							Masonry shear wall MSW12, grouted solid							Incl. Above	
							BR-01 - Sicilian bond							Incl. Above	
							BR-02 - Sicilian bond protruded brick every 4th							Incl. Above	
							BR-03 - Sicilian bond protruded brick every 3rd							Incl. Above	
							BR-04 - Sicilian bond protruded brick every 2nd							Incl. Above	
							BR-05 - Soldier course header							Incl. Above	
							BR-06 - Standard brick - running bond - thin assembly							Incl. Above	
		B20		04 42 00 Exterior Stone Cladding										W/ 042000	
							ST-01 Stone veneer - none shown								
		B20		04 72 00 Cast Stone Masonry											
							CS-01 Cast stone window sills, approx 2" th x 8" deep							W/ 042000	
							CS-01 Cast stone window sills, approx 2" th x 14" deep w/ a 90 degree angle							W/ 042000	
			copy above cell and insert copied cell above the row												
							DIVISION 04 - MASONRY SUB TOTAL			**$ 993,383.00**	**$ 2,350,000.00**	**$ 350,000.00**		**$ 3,693,383.00**	
			DIVISION 05 - METALS												
		B10		05 12 00 Structural Steel Framing										$ -	
		B10					05120 Structural Steel Framing	1.00	LS	$ 446,407.00	$ 737,000.00	$ 80,000.00	$ 1,263,407.00	$ 1,263,407.00	
							Structural steel - galvanized mechanical dunnage supports - assume 25lbs/sf 1/A-453	5.00	TON				$ -	Incl. Above	
							Structural steel elevator hoist beams, machine beams, rail supports, divider curtain and interior s	1.19	TON				$ -	Incl. Above	
							Hanging rods to support running track. 2 1/2" dia. solid painted steel rods with custom brackets t	16.00	EA				$ -	Incl. Above	
							Provide temporary shoring of elements supported by hangers until roof is constructed	16.00	EA				$ -	Incl. Above	
							Structural steel tube framing for acoustical screen at roof	6.50	TON				$ -	Incl. Above	
							Base plates for structural steel tube framing for acoustical screen at roof and other misc. locatio	22.00	EA				$ -	Incl. Above	
							Continuous steel angles to support floor/roof CLT panels with steel embedment plate at masonry	1,518.00	LF				$ -	Incl. Above	
							Steel stub post standoff between concrete slab and wood timber frame. Detail on S-501	48.00	EA				$ -	Incl. Above	
							Steel plate connection for glulam wood beam to masonry wall. Detail on S-501 - w/ Glulan							Incl. Above	
							Angle brackets and diagonal angle brace at basketball backboard support	6.00	EA				$ -	Incl. Above	
							Custom steel brackets at roll down divider curtain - w/ curtain							Incl. Above	
							Custom steel bent plate (6" x 3") for guard rail stanchion attachment - w/guardrail							Incl. Above	
							Brick shelf angle (L7" x 4"), dwg A422-3	1,097.00	LF				$ -	Incl. Above	
							Angle (L4" x 4")							Incl. Above	
							Lintel assembly at windows including sawtooth shaped steel spine, steel horseshoe brackets eve	228.00	LF				$ -	Incl. Above	
		B10		05 40 00 Cold-Formed Metal Framing											
13		B10					6" light gage metal framing backup at exterior wall panels with 4" mineral wool insulation and gyp	14,797.00	SF	$ 150,000.00	$ 370,000.00	$ 35,500.00	$ 37.54	$ 555,500.00	
14		B10					Parapet walls: '8" metal stud with R-30 insulation, including 4" metal studs as diagonal bracing	2,751.00	SF	$ 28,000.00	$ 70,000.00		$ 35.62	$ 98,000.00	
15		B10					Exterior wall backup at parapet walls and at mechanical equipment enclosure: 6" light gage meta	701.00	SF	$ 8,076.00	$ 20,000.00	$ 5,000.00	$ 47.18	$ 33,076.00	
		B20		05 50 00 Metal Fabrications											
16		B20					055000 Metal Fabrications	1.00	LS	$ 425,000.00	$ 575,000.00	$ 30,000.00	$ 1,030,000.00	$ 1,030,000.00	
							Metal guard railing assembly - deck mounted, roof								
							Roof access ladders								
							Elevator pit ladder								
							Sump pit grate 2' x 2'								
							Grate at sewage ejector pit								
							Sewage ejector grate 4' x 4'								
							Custom Smoke vent - 4'x4"x1'8" at elevator - A-404								
							42" ptd mtl pipe perimeter safety guardrail - A-510								
							Operable gates at safety guardrail for FDNY Access								
		B10		05 51 13 Metal Pan Stairs										W/ 055000	
							Metal Pan Stairs including support, channel , framing , deck etc.								
							Metal pan stair w/ concrete treads at Stair A, 50 risers, 4'-0"W risers								
							Metal pan stair w/ concrete treads at Stair B, 24 risers, 4'-4"W risers								

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
							Metal pan stair w/ concrete treads at Stair C, 26 risers, 3'-0"W risers								
							Roof access from stair A to bulkhead								
							Mesh infill with framing at Stair B from 2nd fl to roof								
							Self closing gate at Stair A second 2nd								
		B10		05 51 19 Metal Grating Stairs										W/ 055000	
							Metal grating, steps and platform over RTU, DOS & ductwork								
							Guardrail at platforms								
		B20		05 52 13 Pipe and Tube Railings										W/ 055000	
							1 1/4" dia pipe shd.40 steel top rail w/vertical rods @4" O.C. at stairs A, B & C								
							Painted arch steel frame guard rail with custom metal mesh in fill								
							Cane detection rail at Lobby stair & Cellar Stair C								
		B10		05 73 00 Decorative Metal Railings											
							Metal handrail at stairs								
		B10		05 75 00 Decorative Formed Metal										W/ 055000	
							MTL-2A, 3A, Painted architectural steel frame guardrail w/ architectural grade custom metal mesh infill at gymnasium								
							MTL-2B, 3B, Painted architectural steel frame guardrail w/ architectural grade custom metal mesh infill at lobby stair								
							Powder coated carbon steel railing around lobby opening								
							Steel toe kick at reception desk	33.00	LF						
							Floor mounted dance barre with structural steel frame & posts	46.00	LF						
			copy above cell and insert copied cell above the row												
							DIVISION 05 - METALS SUB TOTAL			**$ 1,057,483.00**	**$ 1,772,000.00**	**$ 150,500.00**		**$ 2,979,983.00**	
			DIVISION 06 - WOOD, PLASTICS, COMPOSITES												
		C20		06 10 00 Rough Carpentry											
17		C20					Treated wood blocking	37,634.00	SF	$ 128,000.00	$ 285,000.00		$ 10.97	$ 413,000.00	
							Interior & Exterior Scaffolding with G.R.								
		B10		06 16 00 Sheathing											
18		B10					Sheathing to exterior walls	5,931.00	SF	$ 12,620.00	$ 36,000.00		$ 8.20	$ 48,620.00	
		B10		06 18 00 Glued-Laminated Construction											
19		B10					Furnish & Installation of all Glulam, connections, etc	37,869.00	SF	$ 2,175,000.00	$ 2,858,271.00	$ 250,000.00	$ 139.51	$ 5,283,271.00	
							Crane/Hoisting - included in GR							Incl. Above	
							CLT 4.125 floor and roof decking, 3-ply included							Incl. Above	
							CLT 4.125 floor and elevator bulkhead decking, 5-ply - det 2/S-102 - included							Incl. Above	
							Glulam Columns, 14" x 14" - included							Incl. Above	
							Glulam Columns, 18" x 18" - included							Incl. Above	
							Glulam ledgers - included							Incl. Above	
							Glulam Beam 8.75" x 19.5" GL - included							Incl. Above	
							Glulam Beams, 8.75" x 16.5" GL - included							Incl. Above	
							Beam 8.75" x 24" GL - included							Incl. Above	
							Beam 8.75" x 25.5" GL - included							Incl. Above	
							Glulam Beams, 10.75" x 15" GL - included							Incl. Above	
							Beam 10.75" x 24" GL - included							Incl. Above	
							Glulam Beams, 10.75" x 25.5" GL - included							Incl. Above	
							Glulam Beams, 10.75" x 30" GL - included							Incl. Above	
							Glulam Beams, 10.75" x 33" GL - girders - included							Incl. Above	
							Glulam Beams, 12.25" x 18" GL - included							Incl. Above	
							Glulam Beams, 12.25" x 19.5" GL - included							Incl. Above	
							Glulam Beams, 12.25" x 21" GL - included							Incl. Above	
							Glulam Beams, 12.25" x 24" GL - girders - included							Incl. Above	
							Glulam Beams, 10.75" x 15" GL - included							Incl. Above	
							Glulam Beams, 10.75" x 19.5" GL - included							Incl. Above	
							Glulam Beams, 8.75" x 30" GL - included							Incl. Above	
							Glulam Beams, 12.25" x 33"GL - girders - included							Incl. Above	
							Glulam Beams, 12.25" x 36"GL - girder - included							Incl. Above	
							Glulam Beams, 12.25" x 37"GL - included							Incl. Above	
							Glulam Beams, 8.75" x 21" GL - included							Incl. Above	
							Beam 8.75" x18" GL - included							Incl. Above	
							Beam 8.75" x 13.5" GL - included							Incl. Above	
							Beam 8.75" x 33" GL - included							Incl. Above	
							Beam 8.75" x 22.5" GL - included							Incl. Above	
							Beam 12.25" x 28.5" GL - included							Incl. Above	
							Beam 10.75" x 27" GL - girder - included							Incl. Above	
							Beam 12.25" x 27" GL - girder - included							Incl. Above	
							Beam 12.25" x 30" GL - included							Incl. Above	
							Beam 18" x 60" GL - girder - included							Incl. Above	
							Shear splice in ridge girder - included							Incl. Above	
							Moment slice in 18 x 66 girders							Incl. Above	
							Diaphragm straps - included							Incl. Above	
							Collector reinforcing plates - included							Incl. Above	
							Bent plate at roof valley- included							Incl. Above	
							Second floor beam/girder penetrations - included							Incl. Above	
							Diagonal Bracing, steel pipes, beam pockets, etc. - included							Incl. Above	
20		C20		06 20 23 Interior Finish Carpentry				1.00	LS	$ 170,000.00	$ 84,000.00		$ 254,000.00	$ 254,000.00	

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
							Wood veneer desktop with exposed hardwood edge at reception desk, 2'8" deep							Incl. Above	
							Wood veneer interior fascia at lobby reception desk							Incl. Above	
							Custom wood veneer cubbies at teen room (24 ea)							Incl. Above	
							Built-in wooden bench with storage cubbies underneath at dance room							Incl. Above	
							Wooden bench at after school							Incl. Above	
							Custom wooden bench at lobby stairs							Incl. Above	
							Wood veneer cladding at storefront (IG-01A,01B) header per detail 2/A465							Incl. Above	
							Storage cabinet with trash and lockable doors at locker							Incl. Above	
							Plam upper cabinet							Incl. Above	
							Plam base cabinet with sink							Incl. Above	
		C20		06 41 13 Wood-Veneer-Faced Architectural Cabinets										W/ 062023	
							Custom wood veneer cubbies at classroom & after school room, 27' (l) x 18" (d) x 4' (h), 50-storage compartments							W/ 062023	
							Undercounter lockable & open shelf cabinets at reception desk							W/ 062023	
							Upper cabinets							W/ 062023	
							Base cabinets							W/ 062023	
							Base cabinets with sink							W/ 062023	
							Storage file cabinets at offices							W/ 062023	
			copy above cell and insert copied cell above the row												
							DIVISION 06 - WOOD, PLASTICS, COMPOSITES SUB TOTAL			**$ 2,485,620.00**	**$ 3,263,271.00**	**$ 250,000.00**		**$ 5,998,891.00**	
			DIVISION 07 - THERMAL AND MOISTURE PROTECTION												
21		B10		07 13 26 Self-Adhering Sheet Waterproofing				1.00	LS	$ 180,000.00	$ 262,000.00		$ 442,000.00	$ 442,000.00	
							Waterproofing at slab on grade - basement & first floor							Incl. Above	
							Air barrier, membrane, insulation, etc. at foundation wall, footing, pile cap, column footing, etc							Incl. Above	
							Drainage mat at waterproofing - w//above							Incl. Above	
							Waterproofing JC							Incl. Above	
							Waterproofing bathroom & showers							Incl. Above	
		B10		07 14 16 Cold Fluid-Applied Waterproofing										W/ 071226	
							Waterproofing at elevator, sump & sewage pit slab & wall							W/ 071226	
		A40		07 21 00 Thermal Insulation										W/ 071226	
							Rigid insulation at slab on grade 2" thick							W/ 071226	
							Rigid insulation at walls & foundations below on grade. 3" thick - w/above							W/ 071226	
							Protection board at insulation - w/above							W/ 071226	
							Rigid insulation and protection board at parapet walls, 2" thick							W/ 071226	
							Rigid insulation on top of parapet walls, 2" thick							W/ 071226	
							Rigid insulation on top of parapet walls, 2" thick							W/ 071226	
							Structural foam infill at midlanding of lobby stair, 3' deep							W/ 071226	
							4" semi rigid insulation at walls above roof at brick or metal siding - w/trade							W/ 071226	
		B20		07 27 15 Nonbituminous Self-Adhering Sheet Air Barries										W/061000	
							Non-bituminous self-adhering sheet air barriers - w/trades							W/061000	
		B30		07 42 13.13 Formed Metal Wall Panels											
22		B30					MT-02 Perforated metal cladding system at mechanical screen with sub girts	1.00	LS	$ 92,250.00	$ 65,000.00		$ 157,250.00	$ 157,250.00	
							MT-02 Perforated metal cladding system at mechanical well							Incl. Above	
							MT-02 Perforated metal door (3' x 7') at mechanical screen wall							Incl. Above	
		B30		07 42 93 Soffit Panels											
							Entry soffit - metal panel system, 2 1/2" semi-rigid insulation, dens-glass sheathing, 6" metal stud (horizontal) with R19 batt insulation Detail 4/A-422.00						W/ 074213.13	
		B31		07 56 00 Fluid-Applied Roofing										$ -	
23		B20					Conventional roofing system over CLT floor slab / heavy timber, sloping, includes vapor barrier,	20,484.00	SF	$ 512,442.00	$ 1,135,000.00		$ 80.43	$ 1,647,442.00	
							Flashing membrane up vertical portion of parapet and over wall assembly at conventional sloping roof							Incl. Above	
		B30		07 62 00 Sheet Metal Flashing and Trim											
							Metal counterflashing at wall/roof intersection, mech screen curb/roof intersection and at mechanical equipment curbs and ducts							W/075600	
							Roof drain flashings - conventional roof							W/075600	
							Overflow roof drain flashings - conventional roof							W/075600	
							Roof drain flashings - IRMA roof							W/075600	
							Overflow roof drain flashings - IRMA roof							W/075600	
							Vent stack flashings							W/075600	
							Pipe flashings							W/075600	
							Post/pipe flashings at supports for metal grate/steps over ductwork and mechanical screen							W/075600	
							Guard railing post flashings							W/075600	
		B30		07 71 00 Roof Specialties										W/075600	
							Coping, aluminum - approx. 1'9" wide							W/075600	
							Coping, aluminum - approx. 11" wide							W/075600	
							Bent metal coping/gravel stop - approx. 8" wide							W/075600	
		B30		07 72 00 Roof Accessories										W/075600	
							Equipment rails for ACCU and duct supports							W/075600	
		B30		07 72 73 Vegetated Roof Systems										W/075600	
							RF1B - Pitched Roof - green roof, modular green tray with sedum, hardy drought tolerant plants. Detail 2/A-450							W/075600	
							RF2B - @ green roof, modular green tray with sedum, hardy drought tolerant plants. Detail 3/A-450							W/075600	
		B10		07 81 23 Intumescent Fire Protection (Formerly Intum. Fireproofing)											
							Intumescent paint protection, at pipes supporting edge of suspended mezz running track							W/ 099123	
		C10		07 84 13 Penetration Firestopping											
							Penetration firestopping - w/below								
		C10		07 84 43 Joint Firestopping											

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
							Firestopping							W/ 092900	
		B20		07 91 00 Preformed Joint Seals											
							Caulking - w/trades								
		B20		07 92 00 Joint Sealants											
							Interior joint caulking, sealants								
24		B20					Expansion joint, vertical	534.00	LF	$ 1,750.00	$ 3,500.00		$ 9.83	$ 5,250.00	
														$ -	
			copy above cell and insert copied cell above the row												
							DIVISION 07 - THERMAL AND MOISTURE PROTECTION SUB TOTAL			**$ 786,442.00**	**$ 1,465,500.00**			**$ 2,251,942.00**	
			DIVISION 08 - OPENINGS												
25		C10		08 11 13 Hollow Metal Doors and Frames				1.00	LS	$ 150,000.00	$ 95,000.00		$ 245,000.00	$ 245,000.00	
							Type A1, Single heavy metal door & frame at interior, 3' x 8'							Incl. Above	
							Type A1, Single heavy metal door & frame at interior, 3' x 8', 45 Min FR							Incl. Above	
							Type A1, Single heavy metal door & frame at interior, 3' x 8', 90 Min FR							Incl. Above	
							Type A1, Single heavy metal door & frame at interior, 3' x 8', 90 Min FR - Closet							Incl. Above	
							Type A2, Double heavy metal door & frame at interior, 6' x 8'							Incl. Above	
							Type A4, Single soundproof with integrated vision glass at interior, 3' x 8'							Incl. Above	
							Type C1: Exterior: Single hollow metal door, frame, and hardware							Incl. Above	
		C10		08 31 13 Access Doors and Frames										W/092900	
							Governor inspection exterior access door at elevator overrun, 2' x 2'							W/092900	
							Hinged access panel for Mech Equipment (4' x 7') in exterior acoustic sound wall							W/092900	
							Hinged access panels for MEPS systems							W/092900	
		C10		08 31 23 Floor Doors											
							Floor door at detention tanks							W/310000	
		B20		08 42 13 Aluminum-Framed Entrances											
							Type D.1, Single glass door and hardware at entry (exterior)							W/ 084413	
							Type D.2, Double glass door and hardware at entry (exterior)							W/ 084413	
26		B20		08 44 13 Glazed Aluminum Curtain Walls				1.00	LS	$ 1,325,316.00	$ 2,455,000.00		$ 3,780,316.00	$ 3,780,316.00	
							Exterior thermally broken curtainwall system CW-01a thru CW-35, incl MT-01 insulated painted	6,721.00	SF				$ -	$ -	
							Aluminum windows, media lab							$ -	
		B20		08 71 00 Door Hardware										W/ 081113	
							Hardware set for door type A1							$ -	
							Hardware set for door type A2 & A3							$ -	
							Hardware set for door type A4							$ -	
							Hardware set for door type B1							$ -	
							Hardware set for door type B2							$ -	
							Hardware set for door type C1							$ -	
							Hardware set for door type D1							$ -	
							Hardware set for door type D2							$ -	
		B20		08 80 00 Glazing										W/ 084413	
							W1, Impact resistant interior glazed window at gym office							$ -	
							W2, Soundproof vision panel at AV room							$ -	
		C10		08 83 00 Mirrors										$ -	
							MR-01, Surface mounted & replaceable wall mirror at Cardio, Weight, Dance, and Spin Rooms							W/ 084413	
		B30		08 88 13 Fire-Rated Glazing										$ -	
							CW-04A/04B, Interior entry storefront at main entrance, fire-rated, 60 mins							W/ 084413	
							IG-1A,1B,1C, Gymnasium glass w/frame, laminated fire protective rated (non heat barrier) - 45 mins (includes distraction banding)							W/ 084413	
							IG-04 thru IG-16, Storefront, fire resistance rated (heat barrier) glazing - 60 mins (includes distraction banding)							W/ 084413	
							Type B1, Single glazed door, frame, and hardware, at interior, 3' x 8'							W/ 084413	
							Type B2, Double glazed door, frame, and hardware, at interior, 6' x 8'							W/ 084413	
		B20		08 88 53 Security Glazing										$ -	
							PS-01, Security polycarbonate glazing retro-fitted over lower level curtain wall & doors, color to match curtain wall, dwg A-411.00							W/ 084413	
			copy above cell and insert copied cell above the row												
							DIVISION 08 - OPENINGS SUB TOTAL			**$ 1,475,316.00**	**$ 2,550,000.00**			**$ 4,025,316.00**	
			DIVISION 09 - FINISHES												
27		C10		09 29 00 Gypsum Board				1.00	LS	$ 375,000.00	$ 1,180,000.00		$ 1,555,000.00	$ 1,555,000.00	
							Type A3: 3-5/8" metal studs, (1) 5/8" gwb on (2) sides, Insulation							Incl. Abve	
							Type A3R: 1-hr rated: 3-5/8" metal studs, (1) 5/8" gwb on (2) sides, Insulation							Incl. Abve	
							Type A5: 6" metal studs, (1) 5/8" gwb on (2) sides, Insulation							Incl. Abve	
							Type B3R: 2-hr rated:3-5/8" metal studs, (2) type X 5/8" gwb on (2) sides, Insulation							Incl. Abve	
							Type D1: 1-hr rated: 3-5/8" metal studs, (2) type X 5/8" gwb on (2) sides, Insulation							Incl. Abve	
							Type D2: 1-hr rated: (2) 3-5/8" metal studs, (2) type X 5/8" gwb on (2) sides, Insulation							Incl. Abve	
							Type F0: 7/8" metal studs, (1) type X 5/8" gwb on (1) side							Incl. Abve	
							Type F1: 1 5/8" metal studs, (1) type X 5/8" gwb on (1) side							Incl. Abve	
							Type F2: 2-1/2" metal studs, (1) type X 5/8" gwb on (1) side							Incl. Abve	
							Type F3A: 3-5/8 metal studs, (1) type X 5/8" gwb on (1) side							Incl. Abve	
							Type F3B: 3-5/8" metal studs, (2) type X 5/8" GWB on (1) side							Incl. Abve	
							Type F4A: (2) 3-5/8" metal studs, (1) type X 5/8" GWB on (1) side							Incl. Abve	
							Type K1: 2-1/2" C-H metal studs, (2) type X 5/8" gwb on (1) side, (1) type 1" x 24" gypsum wall liner panel on (1) side, Insulation							Incl. Abve	
							Type K2: 4" C-H metal studs, (2) type X 5/8" gwb on (1) side, (1) type 1" x 24" gypsum wall liner panel on (1) side, Insulation							Incl. Abve	
							Type P1: 1-5/8" metal studs, (1) 5/8" gwb on (2) sides, (2) Insulation							Incl. Abve	
							Type A3 partition with high gauge metal studs at double height lobby space							Incl. Abve	

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
							GWB laminate on top of CMU wall							Incl. Abve	
							Skim coat wall to receive level 5 finish							Incl. Abve	
							Window pocket at dance room per detail 6/A813							Incl. Abve	
							Premium for cement backer board at wall tiles							Incl. Abve	
							GWB Ceiling							Incl. Abve	
							Ceiling soffit, 4' - 5' wide							Incl. Abve	
							Ceiling soffit, 6' - 7' wide							Incl. Abve	
							Ceiling soffit, 7' - 8' wide							Incl. Abve	
							Rated GWB Enclosure for Electrical Conduits as per A-623							Incl. Abve	
28		C10		09 30 13 Ceramic Tiling				1.00	LS	$ 130,000.00	$ 240,000.00		$ 370,000.00	$ 370,000.00	
							TL-1/TL-3, Porcelain floor tile, 12" x 24"							Incl. Abve	
							TL-2, Porcelain floor tile, 2" x 2"							Incl. Abve	
							TL-5, 4" Porcelain tile base							Incl. Abve	
							TL-6, 4" Porcelain tile base							Incl. Abve	
							TL-5, Porcelain 3-dimensional tile feature wall at reception, 2" x 8"							Incl. Abve	
							TL-6, Porcelain wall tile, 12" x 24"							Incl. Abve	
							TL-4/TL-7, Porcelain wall tile, 2" x 8"							Incl. Abve	
							Backsplash							Incl. Abve	
		C10		09 51 00 Acoustical Ceilings										$ -	
29		C10					MTL-1, Open cell metal panel dropped ceilings, 2'x2'	3,800.00	SF	$ 129,000.00	$ 56,240.00		$ 48.75	$ 185,240.00	
30		C10					ACT-5, Armstrong S8 Rectangles 6" depth open cell kit at AV Room	650.00	SF	$ 19,825.00	$ 5,000.00		$ 38.19	$ 24,825.00	
31		C10					ACT-6, Rock on 5/8" stone wool tile 0.85 NRC, Koral, 2'x4'	2,300.00	SF	$ 18,400.00	$ 11,000.00		$ 12.78	$ 29,400.00	
		C20		09 64 66 Wood Athletic Flooring										$ -	
32		C20					WD-1, Wood base	448.00	LF	$ 6,325.00	$ 14,000.00		$ 45.37	$ 20,325.00	
33		C20					WD-1, Wood flooring at dance room	3,862.00	SF	$ 42,000.00	$ 62,600.00		$ 27.08	$ 104,600.00	
34		C20					WD-2, Maple sports floor at gymnasium	7,288.00	SF	$ 96,250.00	$ 132,000.00		$ 31.32	$ 228,250.00	
		C20		09 65 13 Resilient Base and Accessories										$ -	
							WB-1, 4" Vented rubber base							W/ Wood Flooring	
35		C20					WB-2, 4" Rubber base	3,425.00	LF	$ 3,500.00	$ 8,500.00		$ 3.50	$ 12,000.00	
		C20		09 65 19 Resilient Tile Flooring										$ -	
							RF-6 through RF-9, Rubber flooring, 2'x2'							W/ 096566	
		C20		09 65 43 Linoleum Flooring										$ -	
36		C20					RF-5, Takett, Linoleum SD Static Dissipative XF2, Plumb Gray	139.00	SF	$ 450.00	$ 800.00		$ 8.99	$ 1,250.00	
37		C20		09 65 66 Resilient Athletic Flooring				1.00	LS	$ 229,050.00	$ 240,000.00		$ 469,050.00	$ 469,050.00	
							RF-1, Robbins, Plastic Pro Comfort 110, Autumn Leaves							Incl. Abve	
							RF-2, Regupol, Aktivpro Roll, Gray Hound							Incl. Abve	
							RF-3, Regupol, Aktivpro Roll, Sunkist							Incl. Abve	
							RF-4, Regupol, Sonusfit M520, Sunkist+H429							Incl. Abve	
							Floor reducer strips							Incl. Abve	
		C20		09 68 13 Tile Carpeting											
38		C20					CP-1/2, 12" x 48"	1,164.00	SF	$ 6,000.00	$ 3,000.00		$ 7.73	$ 9,000.00	
		C20		09 72 00 Wall Coverings										$ -	
39		C20					WP-2, AMCork 1/2"cork sheet at multi-purpose rooms A & B Columns, 7'-8" H	198.00	SF	$ 1,500.00	$ 2,400.00		$ 19.70	$ 3,900.00	
40		C20					FRP at Cellar	776.00	SF	$ 2,555.00	$ 6,750.00		$ 11.99	$ 9,305.00	
		C20		09 77 23 Fabric-Wrapped Panels										$ -	
41		C20					ACT-1,2,3, 1" fabric wrapped panel	5,985.00	SF	$ 65,307.00	$ 90,000.00		$ 25.95	$ 155,307.00	
42		C20					ACT-4, 2" fabric wrapped panel	300.00	SF	$ 3,560.00	$ 4,500.00		$ 26.87	$ 8,060.00	
43		C20		09 91 23 Interior Painting				1.00	LS	$ 78,000.00	$ 235,000.00		$ 313,000.00	$ 313,000.00	
							Paint walls							Incl. Abve	
							Paint door and frame							Incl. Abve	
							Paint GWB ceiling & soffits							Incl. Abve	
							Paint exposed concrete structure at cellar							Incl. Abve	
							Paint exposed wood structure ceiling							Incl. Abve	
							Paint exposed beams at wood structure ceiling							Incl. Abve	
							Patch, painting, final touch-up							Incl. Abve	
							Paint basketball, volleyball & pickleball courtlines							Incl. Abve	
							Paint running track markings							Incl. Abve	
		C20		09 96 00 High-Performance Coatings (MPI)										W/ 099123	
							CTG-1, Wall sealer at exposed interior CMU partitions							W/ 099123	
							Concrete Sealer at CONC-1 - similar to Euclid EUCO Diamond Hard							W/ 099123	
														W/ 099123	
			copy above cell and insert copied cell above the row												
							DIVISION 09 - FINISHES SUB TOTAL			**$ 1,206,722.00**	**$ 2,291,790.00**			**$ 3,498,512.00**	
			DIVISION 10 - SPECIALTIES												
		C10		10 11 00 Visual Display Units										$ -	
44		C10					Cork board	198.00	SF	$ 2,368.00	$ 1,485.00		$ 19.46	$ 3,853.00	
		C10		10 14 19 Dimensional Letter Signage										$ -	
45		C10					Exterior signage: powder coated metal signage, pin mounted to cladding "Walter Gladwin Recre	1.00	EA	$ 2,250.00	$ 5,000.00		$ 7,250.00	$ 7,250.00	
46		C10					Exterior signage: powder coated metal signage, pin mounted to cladding "Walter Gladwin Recre	1.00	EA	$ 1,650.00	$ 3,800.00		$ 5,450.00	$ 5,450.00	
47		C10					Exterior signage: powder coated metal signage, pin mounted to cladding Park Logo 8'11" diame	1.00	EA	$ 7,500.00	$ 4,500.00		$ 12,000.00	$ 12,000.00	
48		C10					Exterior signage: powder coated metal signage, pin mounted to cladding Park Logo 2'6" diamete	1.00	EA	$ 2,500.00	$ 1,750.00		$ 4,250.00	$ 4,250.00	

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
		G20		10 14 23 Panel Signage										$ -	
49		G20					Type E1, Egress Map, 12.5" x 20"	3.00	EA	$ 600.00	$ 450.00		$ 350.00	$ 1,050.00	
50		G20					Type E2, Elevator Jamb ID, 4" x 8"	3.00	EA	$ 225.00	$ 450.00		$ 225.00	$ 675.00	
51		G20					Type E4, Emergency Exit ID, 7.5" x 4.5"	4.00	EA	$ 300.00	$ 600.00		$ 225.00	$ 900.00	
52		G20					Type E5, Roof Access ID, 7.5" x 5.5"	1.00	EA	$ 125.00	$ 150.00		$ 275.00	$ 275.00	
53		G20					Type E6, Occupancy, 18" x 11.5"	2.00	EA	$ 300.00	$ 300.00		$ 300.00	$ 600.00	
54		G20					Type S1, Stair ID - Occupant Side, 12.5" x 17.45"	8.00	EA	$ 1,600.00	$ 1,200.00		$ 350.00	$ 2,800.00	
55		G20					Type S2, Stair ID - Stair Side, 15" x 20"	6.00	EA	$ 1,200.00	$ 900.00		$ 350.00	$ 2,100.00	
56		G20					Type Z1, Floor Directory, 11" X 18"	2.00	EA	$ 400.00	$ 300.00		$ 350.00	$ 700.00	
57		G20					Type F1, "Fire Command Center"	1.00	EA	$ 175.00	$ 150.00		$ 325.00	$ 325.00	
58		G20					Type G4, Assistive Listening Signage	1.00	EA	$ 125.00	$ 150.00		$ 275.00	$ 275.00	
59		G20					Type U, Utility ID, 7.5" x 3 1/2"	33.00	EA	$ 2,475.00	$ 4,950.00		$ 225.00	$ 7,425.00	
60		G20					Type T1, Restroom ID, 7.5" x 10"	5.00	EA	$ 500.00	$ 750.00		$ 250.00	$ 1,250.00	
61		G20					Type T2, Restroom ID, 7.5" x 10"	1.00	EA	$ 100.00	$ 150.00		$ 250.00	$ 250.00	
62		G20					Type T3, Locker Room ID, 7.5" x 12"	5.00	EA	$ 750.00	$ 750.00		$ 300.00	$ 1,500.00	
63		G20					Type T4, Shower Room ID, 7.5" x 12"	2.00	EA	$ 300.00	$ 300.00		$ 300.00	$ 600.00	
64		G20					Type R, Room ID	18.00	EA	$ 1,800.00	$ 2,700.00		$ 250.00	$ 4,500.00	
		C10		10 21 13.19 Plastic Toilet Compartments										$ -	
65		C10					Toilet compartments, Standard	7.00	EA	$ 8,750.00	$ 6,500.00		$ 2,178.57	$ 15,250.00	
66		C10					Toilet compartments, ADA-compliant	5.00	EA	$ 7,250.00	$ 6,050.00		$ 2,660.00	$ 13,300.00	
67		C10					Urinal screens	3.00	EA	$ 1,500.00	$ 750.00		$ 750.00	$ 2,250.00	
		C10		10 22 40 Glazed Interior Wall and Door Assemblies										$ -	
							Carried in 08 88 13 Fire-Rated Glazing							$ -	
		C10		10 26 13 Corner Guards										$ -	
68		C10					Corner Guards	10.00	EA	$ 500.00	$ 750.00		$ 125.00	$ 1,250.00	
69		C10		10 28 13 Toilet Accessories				1.00	LS	$ 15,572.00	$ 13,600.00		$ 29,172.00	$ 29,172.00	
							Mirror at locker rooms & restrooms, 2' x 4' high							Incl. Abve	
							Mirror at locker rooms & restrooms, 4'-9" X 6'-4" high							Incl. Abve	
							Locker room bench, ADA							Incl. Abve	
							Locker room bench							Incl. Abve	
							ADA grab bars - 18", 24", 36" & 42" long							Incl. Abve	
							Hand & liquid soap dispenser							Incl. Abve	
							Paper towel dispenser							Incl. Abve	
							Hand dryer							Incl. Abve	
							Shower seat							Incl. Abve	
							Shower rod							Incl. Abve	
							Shower curtain							Incl. Abve	
							Toilet paper dispenser							Incl. Abve	
							Waste receptacle							Incl. Abve	
							Towel hooks							Incl. Abve	
							Shelf w/ broom/MOP holder & rag hooks at janitor's closet							Incl. Abve	
							Surface mounted baby changing stations (Install only)							Incl. Abve	
							Saddle							Incl. Abve	
70		D40		10 44 13 Fire Protection Cabinets			Fire cabinets & Extinguishers	1.00	LS	$ 5,340.00	$ 4,400.00		$ 9,740.00	$ 9,740.00	
							Fire cabinets & Extinguishers							Incl. Abve	
		D40		10 44 16 Fire Extinguishers											
							Fire extinguisher							W/104413	
		C10		10 51 26 Plastic Lockers										$ -	
71		C10					2-tier lockers, 15" x 15" x 88"	120.00	EA	$ 72,000.00	$ 56,000.00		$ 1,066.67	$ 128,000.00	
														$ -	
														$ -	
			copy above cell and insert copied cell above the row												
							DIVISION 10 - SPECIALTIES SUB TOTAL			**$ 138,155.00**	**$ 118,835.00**			**$ 256,990.00**	
			DIVISION 11 - EQUIPMENT												
		E10		11 11 36 Vehicle Charging Equipment										$ -	
72		E10					Power to Electrical Vehicle Charging Station	1.00	JOB	$ 2,500.00	$ 1,500.00		$ 4,000.00	$ 4,000.00	
							EV charging station - included							$ -	
							Conduit and wire - included							$ -	
73		E10		11 30 10 Appliances				3.00	EA	$ 8,500.00	$ 825.00		$ 3,108.33	$ 9,325.00	
							APP-1, Refrigerator, at staff office kitchenette							Incl. Abve	
							APP-2, Refrigerator, at after school room							Incl. Abve	
							APP-3, Refrigerator, at CNTR manager's room							Incl. Abve	
74		E10		11 66 23 Gymnasium Equipment				1.00	LS	$ 105,000.00	$ 130,000.00		$ 235,000.00	$ 235,000.00	
							Retractable basketball hoop							Incl. Abve	
							WP-1, Wall pad, 2' x 7' high							Incl. Abve	
							In ground sleeve for volleyball post							Incl. Abve	
		E10		11 66 53 Gymnasium Dividers										$ -	
75		E10					Gymnasium nylon divider curtain	1,325.00	SF	$ 25,000.00	$ 25,000.00		$ 37.74	$ 50,000.00	
														$ -	
			copy above cell and insert copied cell above the row												

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
							DIVISION 11 - EQUIPMENT SUB TOTAL			**$ 141,000.00**	**$ 157,325.00**			**$ 298,325.00**	
			DIVISION 12 - FURNISHINGS												
76		C10		12 24 13 Roller Window Shades				1.00	LS	$ 45,000.00	$ 53,000.00		$ 98,000.00	$ 98,000.00	
							Solar shades							Incl. Abve	
							Solar blackout window shades							Incl. Abve	
		C10		12 36 61.19 Quartz Agglomerate Countertops										W/ Millwork	
							Solid surface countertops at offices, teen room, kitchenette, pantry & wellness suite							W/ Millwork	
							Solid surface countertop at restrooms							W/ Millwork	
		C20		12 48 16 Entrance Floor Grilles										$ -	
							Stainless walk-off mat at entry vestibule							W/ Flooring	
		E20		12 66 00 Telescoping Stands										$ -	
77		E20					Retractable bleachers, 4 tiers	45.00	LF	$ 56,600.00	$ 11,250.00		$ 1,507.78	$ 67,850.00	
														$ -	
			copy above cell and insert copied cell above the row												
							DIVISION 12 - FURNISHINGS SUB TOTAL			**$ 101,600.00**	**$ 64,250.00**			**$ 165,850.00**	
			DIVISION 14 - CONVEYING EQUIPMENT												
		D10		14 24 00 Hydraulic Elevators										$ -	
78		D10					Passenger elevators P1 & P2 incl cab finishes, roped hydraulic, 5,000 lbs, 100 fpm, level Cellar,	2.00	EA	$ 160,000.00	$ 383,840.00		$ 271,920.00	$ 543,840.00	
														$ -	
			copy above cell and insert copied cell above the row												
							DIVISION 14 - CONVEYING EQUIPMENT SUB TOTAL			**$ 160,000.00**	**$ 383,840.00**			**$ 543,840.00**	
			DIVISION 21 - FIRE SUPPRESSION												
		D40		21 05 00 Common Work Results for Fire Suppression										$ -	
79		D40					Division 21 Fire Suppresion Systems	1.00	LS	$ 180,000.00	$ 405,000.00		$ 585,000.00	$ 585,000.00	
							Chopping, patching, core drill							Incl. Abve	
							Fire Stopping							Incl. Abve	
							Rigging - hoisting - setting of equipment Material Handling							Incl. Abve	
							Cabinet with spare sprinklers and wrench Cabinet installed by GC							Incl. Abve	
							Engineering							Incl. Abve	
		D40		21 05 23 General-Duty Valves for Water-Based Fire-Suppression Piping										Incl. Abve	
							Standpipe Riser Isolation Valve							Incl. Abve	
		D40		21 05 29 Hangers and Supports for Fire-Suppression Piping and Equipment										Incl. Abve	
							Hangers and Supports for Fire-Suppression included with piping section 21 11 00							Incl. Abve	
		D40		21 05 48 Vibration and Seismic Controls for Fire-Suppression Piping and Equipment										Incl. Abve	
							Seismic requirements							Incl. Abve	
		D40		21 05 53 Identification for Fire-Suppression Piping and Equipment										Incl. Abve	
							Identification							Incl. Abve	
							Paint Pipe							Incl. Abve	
		Z10		21 08 00 Commissioning of Fire Suppression										Incl. Abve	
							Commissioning Assist							Incl. Abve	
		D40		21 10 00 Water-Based Fire-Suppression Systems										Incl. Abve	
							Service							Incl. Abve	
							6" Double Check Detector Assembly capped installed by Plumber connect to							Incl. Abve	
							1" Valved & Capped Drain							Incl. Abve	
							2-1/2" FHV							Incl. Abve	
							Drain Valve 2-1/2" Pipe size							Incl. Abve	
							Drain Valve 1" Pipe size							Incl. Abve	
							Fire Hose Cabinet material only installed by GC							Incl. Abve	
							Three-way Test Manifold 6"x3x3" Roof							Incl. Abve	
							3"x3"x6" Siamese Connection w/Check Valve & Ball Drip							Incl. Abve	
							Hydrant Flow Test							Incl. Abve	
							Pressure gauge							Incl. Abve	
							Tests of piping - pressure							Incl. Abve	
							3" Shutoff Valve							Incl. Abve	
							4" Shutoff Valve							Incl. Abve	
							6" Shutoff Valve							Incl. Abve	
							Concealed Pendent Heads							Incl. Abve	
							Pendent Heads							Incl. Abve	
							Sidewall Sprinkler Heads							Incl. Abve	
							Upright Sprinkler Heads							Incl. Abve	
							Floor Control Valve Assembly with Inspection Test Connection & Tamper Switch							Incl. Abve	
							Wet Sprinkler Pipe							Incl. Abve	
							Schedule 40 CS Grooved Black							Incl. Abve	
							6" Pipe size							Incl. Abve	
							4" Pipe size							Incl. Abve	
							3" Pipe size							Incl. Abve	
							2-1/2" Pipe size							Incl. Abve	
							2" Pipe Size							Incl. Abve	
							1-1/2" Pipe Size							Incl. Abve	
							1-1/4" Pipe Size							Incl. Abve	
							1" Pipe Size							Incl. Abve	
														Incl. Abve	
			copy above cell and insert copied cell above the row												

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
							DIVISION 21 - FIRE SUPPRESSION SUB TOTAL			**$ 180,000.00**	**$ 405,000.00**			**$ 585,000.00**	
			DIVISION 22 - PLUMBING												
80		D20					Division 22 Plumbing Systems	1.00	LS	$ 600,000.00	$ 1,050,000.00		$ 1,650,000.00	$ 1,650,000.00	
		D20		22 05 00 Common Work Results for Plumbing										Incl. Abve	
							Chopping, patching, core drill							Incl. Abve	
							Fire Stopping							Incl. Abve	
							Rigging - hoisting - setting of equipment material handling							Incl. Abve	
		D20		22 05 23 General-Duty Valves for Plumbing Piping										Incl. Abve	
							Digital Thermostatic Mixing Valve							Incl. Abve	
		D20		22 05 29 Hangers and Supports for Plumbing Piping and Equipment										Incl. Abve	
							Included with section 22 11 16 Domestic Water Piping							Incl. Abve	
		D20		22 05 53 Identification for Plumbing Piping and Equipment										Incl. Abve	
							Identification							Incl. Abve	
		D20		22 05 93 Testing Adjusting and Balancing for Plumbing										Incl. Abve	
							Commissioning Assist							Incl. Abve	
							Tests of piping - pressure							Incl. Abve	
		D20		22 07 19 Plumbing Piping Insulation										Incl. Abve	
							Domestic Water							Incl. Abve	
							4" Pipe Size							Incl. Abve	
							3" Pipe Size							Incl. Abve	
							2" Pipe Size							Incl. Abve	
							1-1/2" Pipe Size							Incl. Abve	
							1" Pipe Size							Incl. Abve	
							3/4" Pipe Size							Incl. Abve	
							1/2" Pipe Size							Incl. Abve	
							8" Pipe size							Incl. Abve	
							6" Pipe size							Incl. Abve	
		Z10		22 08 00 Commissioning of Plumbing										Incl. Abve	
							Commissioning Assist							Incl. Abve	
		D20		22 11 16 Domestic Water Piping										Incl. Abve	
							Type 'L' Copper sldr incl supports & ftgs							Incl. Abve	
							4" Pipe Size							Incl. Abve	
							3" Pipe Size							Incl. Abve	
							2" Pipe Size							Incl. Abve	
							1-1/2" Pipe Size							Incl. Abve	
							1" Pipe Size							Incl. Abve	
							3/4" Pipe Size							Incl. Abve	
							1/2" Pipe Size							Incl. Abve	
							Water Services							Incl. Abve	
							6" Double Check Detector Assembly capped							Incl. Abve	
							3/4" DCDA for HVAC Contractor							Incl. Abve	
							RPZ Backflow Preventer 4" Pipe size							Incl. Abve	
							6" OS&Y Valve w/ Tamper Switch							Incl. Abve	
							4" OS&Y Valve							Incl. Abve	
							Trap Primer							Incl. Abve	
							Refrigerator Hookups							Incl. Abve	
							Temperature & Pressure Relief Valves							Incl. Abve	
							4" Water Meter							Incl. Abve	
							Piping Sch. 40 Ductile Iron							Incl. Abve	
							6" Pipe size							Incl. Abve	
		D20		22 11 17 Gray-Water Piping										Incl. Abve	
							Included with Section 22 11 16 Domestic Water Piping							Incl. Abve	
		D20		22 11 19 Domestic Water Piping Specialties										Incl. Abve	
							Non freeze Hose Bibb							Incl. Abve	
							Water Hammer Arestor							Incl. Abve	
							Shutoff Valves							Incl. Abve	
							HWR Balancing Valves							Incl. Abve	
							Restroom submeter							Incl. Abve	
							Heat Tracing							Incl. Abve	
		D20		22 11 23.13 Domestic-Water Packaged Booster Pumps										Incl. Abve	
							Duplex Domestic Water Booster pump 165gpm, 5hp & Pressure Tank							Incl. Abve	
		D20		22 11 23.21 Domestic-Water In-Line Pumps										Incl. Abve	
							HW Circulating Pump & Aquastat Timer							Incl. Abve	
		D20		22 13 13 Facility Sanitary Sewers										Incl. Abve	
							Cast Iron Hub & Spigot incl supports & ftgs							Incl. Abve	
							8" Pipe size							Incl. Abve	
		D20		22 13 16 Sanitary Waste and Vent Piping										Incl. Abve	
							Cast Iron No Hub incl supports & ftgs							Incl. Abve	
							6" pipe Size							Incl. Abve	
							4" pipe Size							Incl. Abve	
							3" pipe Size							Incl. Abve	
							2" pipe Size							Incl. Abve	
							1-1/2" pipe Size							Incl. Abve	

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
		D20		22 13 19 Sanitary Waste Piping Specialties										Incl. Abve	
							Cleanout Deck Plate							Incl. Abve	
							Pipe Cleanout							Incl. Abve	
		D20		22 13 19.13 Sanitary Drains										Incl. Abve	
							Floor Drain 4"; incl trap seal							Incl. Abve	
							Floor Drain 3"; incl trap seal							Incl. Abve	
							Funnel Drain							Incl. Abve	
							6" House Trap & FAI							Incl. Abve	
		D20		22 13 29 Sanitary Sewerage Pumps										Incl. Abve	
							Duplex Sewer Ejector pump							Incl. Abve	
							Sewer Ejector pump pit by GC							Incl. Abve	
		D20		22 14 14 Storm Drainage Piping										Incl. Abve	
							Cast Iron Hub and Spigot incl support & ftgs							Incl. Abve	
							6" pipe Size							Incl. Abve	
							4" Pipe size							Incl. Abve	
		D20		22 14 23 Storm Drainage Piping Specialties										Incl. Abve	
							4" Roof & Overflow Drains							Incl. Abve	
							Pipe Cleanout							Incl. Abve	
							8" Storm House Trap							Incl. Abve	
		D20		22 14 29 Sump Pumps										Incl. Abve	
							Elevator sump pump;0.5hp, 50gpm with remote controls							Incl. Abve	
		D20		22 33 00 Electric Domestic Water Heaters										Incl. Abve	
							Electric Heat Pump Hot HW Heater 150 gal; 150gph recovery							Incl. Abve	
							Expansion tank							Incl. Abve	
							Drip pan & leak detection							Incl. Abve	
		D20		22 42 00 Commercial Plumbing Fixtures										Incl. Abve	
							Fixtures including sanitary and water Includes roughing and faucets							Incl. Abve	
							Water closet							Incl. Abve	
							Lavatory							Incl. Abve	
							Urinal							Incl. Abve	
							Shower							Incl. Abve	
							Mop sink							Incl. Abve	
							Pantry sink							Incl. Abve	
		D20		22 47 13 Drinking Fountains										Incl. Abve	
							Includes Roughin							Incl. Abve	
							Water Cooler Dual level bottle filler							Incl. Abve	
														Incl. Abve	
			copy above cell and insert copied cell above the row												
							DIVISION 22 - PLUMBING SUB TOTAL			**$ 600,000.00**	**$ 1,050,000.00**			**$ 1,650,000.00**	
			DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)												
		D30		23 05 00 Common Work Results for HVAC										$ -	
		D30					Division 23 HVAC Systems	1.00	LS	$ 1,570,988.00	$ 2,918,000.00		$ 4,488,988.00	$ 4,488,988.00	
							Chopping, patching, core drill - fire sealing							Incl. Abve	
							Crane, Hoisting, Rigging							Incl. Abve	
							Rigging - hoisting - setting of equipment							Incl. Abve	
							Gauges							Incl. Abve	
							Refrigerant Pipe Valves							Incl. Abve	
							Globe Valves							Incl. Abve	
							Ball Valves							Incl. Abve	
							Butterfly Valves							Incl. Abve	
							Check Valves							Incl. Abve	
							Plug Valves							Incl. Abve	
		D30		23 05 29 Hangers and Supports for HVAC Piping and Equipment										Incl. Abve	
							Hangers and Supports included in 232300 & 233113							Incl. Abve	
		D30		23 05 48.13 Vibration Controls for HVAC										Incl. Abve	
							Vibration Control							Incl. Abve	
		D30		23 05 53 Identification for HVAC Piping and Equipment										Incl. Abve	
							Charts and piping identification							Incl. Abve	
							System ID							Incl. Abve	
		D30		23 05 93 Testing, Adjusting, and Balancing for HVAC										Incl. Abve	
							Testing and balance							Incl. Abve	
							Commissioning assist							Incl. Abve	
							Start-up & Training							Incl. Abve	
							Tests of piping - pressure							Incl. Abve	
							Pressure test Ductwork							Incl. Abve	
		D30		23 07 13 Duct Insulation										Incl. Abve	
							Acoustical Lining							Incl. Abve	
							Duct Insulation							Incl. Abve	
		D30		23 07 19 HVAC Piping Insulation										Incl. Abve	
							Insulation incl ftgs, hangers							Incl. Abve	
							Condensate 1-1/4"							Incl. Abve	
							Condensate Pipe 1"							Incl. Abve	
							Condensate Pipe 3/4"							Incl. Abve	

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
							Pipe 1-1/8"							Incl. Abve	
							Pipe 7/8"							Incl. Abve	
							Pipe 3/4"							Incl. Abve	
							Pipe 5/8"							Incl. Abve	
							Pipe 3/8"							Incl. Abve	
		D30		23 08 00 Commissioning of HVAC										Incl. Abve	
							Commissioning Support							Incl. Abve	
		D30		23 09 23 Direct-Digital Control (DDC) System for HVAC										Incl. Abve	
							Direct-Digital Control (DDC) System for HVAC							Incl. Abve	
							DOAS 36pts							Incl. Abve	
							Rooftop AHU 75pts							Incl. Abve	
							Rooftop ERV 5pts							Incl. Abve	
							VRF Outdoor Unit 4pt							Incl. Abve	
							VRF Indoor Unit 4pt							Incl. Abve	
							Drip pan & Leak detection 1pt							Incl. Abve	
							VAV 19pt							Incl. Abve	
							Exhaust Systems 3pt							Incl. Abve	
							Trench Heater 6pt							Incl. Abve	
							Humidification Unit 1pt							Incl. Abve	
							Dehumidification Unit 6pt							Incl. Abve	
							CO2 Monitoring 44pt							Incl. Abve	
							Control Valves; included above							Incl. Abve	
							Energy Meters; included above							Incl. Abve	
							Flow Instruments; included above							Incl. Abve	
							Gas Instruments; included above							Incl. Abve	
							Level Instruments; included above							Incl. Abve	
							Leak Detection Instruments; included above							Incl. Abve	
							Control Dampers; included above							Incl. Abve	
							Temperature Instruments; included above							Incl. Abve	
							Weather Station; included above							Incl. Abve	
							Line and low voltage power; included above							Incl. Abve	
							Tie into BMS, graphics; included above							Incl. Abve	
							Points for Alarms & Plumbing systems 20pt							Incl. Abve	
		D30		23 09 23.12 Control Dampers										Incl. Abve	
							Refer to Section 23 09 23 Direct-Digital Control System for HVAC							Incl. Abve	
		D30		23 09 23.13 Energy Meters										Incl. Abve	
							Refer to Section 23 09 23 Direct-Digital Control System for HVAC							Incl. Abve	
		D30		23 09 23.18 Leak Detection Instruments										Incl. Abve	
							Refer to Section 23 09 23 Direct-Digital Control System for HVAC							Incl. Abve	
		D30		23 09 93.11 Sequence of Operation for HVAC Direct-Digital Control										Incl. Abve	
							Refer to Section 23 09 23 Direct-Digital Control System for HVAC							Incl. Abve	
		D30		23 21 23 Hydronic Pumps										Incl. Abve	
							Condensate Pump							Incl. Abve	
		D30		23 23 00 Refrigerant Piping										Incl. Abve	
							Refrigerant Piping & Condensate Piping							Incl. Abve	
							Copper type L, incl ftgs							Incl. Abve	
							Condensate 1-1/4"							Incl. Abve	
							Condensate Pipe 1"							Incl. Abve	
							Condensate Pipe 3/4"							Incl. Abve	
							Pipe 1-1/8"							Incl. Abve	
							Pipe 7/8"							Incl. Abve	
							Pipe 3/4"							Incl. Abve	
							Pipe 5/8"							Incl. Abve	
							Pipe 3/8"							Incl. Abve	
							Roof Pipe Support							Incl. Abve	
							Refrigerant Pipe Specialties							Incl. Abve	
							410a Refrigerant							Incl. Abve	
		D30		23 31 13 Metal Ducts										Incl. Abve	
							Galv. Steel duct incl oval							Incl. Abve	
							Sound Attenuator							Incl. Abve	
		D30		23 33 00 Air Duct Accessories										Incl. Abve	
							Fire Damper 10x10							Incl. Abve	
							Fire Damper 20x52							Incl. Abve	
							Fire Damper 22x22							Incl. Abve	
							Fire Damper 26x50							Incl. Abve	
							Fire Damper 65x46							Incl. Abve	
							Volume Dampers							Incl. Abve	
							Fire Smoke Dampers & Motorized Dampers							Incl. Abve	
							Access door							Incl. Abve	
		D30		23 34 16 Centrifugal HVAC Fans										Incl. Abve	
							Exhaust Fan Jan Closet 75cfm							Incl. Abve	
							Exhaust Fan Water room 125cfm							Incl. Abve	
							Exhaust Fan Elec room 150cfm							Incl. Abve	

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
							Exhaust Fan Trash room 300cfm							Incl. Abve	
							Back draft damper							Incl. Abve	
		D30		23 34 23 HVAC Power Ventilators										Incl. Abve	
							Refer to Section 23 34 16 Centrifugal HVAC Fans							Incl. Abve	
		D30		23 36 00 Air Terminal Units										Incl. Abve	
							VAV Box up to 2,000cfm							Incl. Abve	
							VAV Box up to 1,000cfm							Incl. Abve	
							VAV Box up to 500cfm							Incl. Abve	
							Unit Support							Incl. Abve	
		D30		23 37 13.13 Air Diffusers										Incl. Abve	
							See 243713.23							Incl. Abve	
		D30		23 37 13.23 Air Registers and Grilles										Incl. Abve	
							Linear Supply Grille 16"L 6"W							Incl. Abve	
							Transfer Grilles							Incl. Abve	
							Supply Grilles							Incl. Abve	
							Exhaust Grilles							Incl. Abve	
							Return Grilles							Incl. Abve	
							WMS							Incl. Abve	
		D30		23 72 23.23 Packaged Outdoor Heat Wheel Energy-Recovery Units										Incl. Abve	
							Energy Recovery Ventilator ERV; 2,600cfm							Incl. Abve	
							Roof Curb							Incl. Abve	
							Airflow Measurement System							Incl. Abve	
		D30		23 74 16.13 Packaged, Large-Capacity, Rooftop Air-Conditioning Units										Incl. Abve	
							Roof top Heat Pump, 28,000cfm, Energy Recovery; VFD, Htg/clg							Incl. Abve	
							Roof Curb							Incl. Abve	
							Airflow Measurement System							Incl. Abve	
		D30		23 74 33 Dedicated Outdoor-Air Units										Incl. Abve	
							Roof top DOAS Economizer; 8,000cfm, VFD, Htg/clg							Incl. Abve	
							Roof Curb							Incl. Abve	
							Airflow Measurement System							Incl. Abve	
		D30		23 81 29 Variable Refrigerant Flow HVAC Systems										Incl. Abve	
							VRF Heat Pump; 20tn							Incl. Abve	
							VRF Heat Pump; 18tn							Incl. Abve	
							VRF Heat Pump; 16tn							Incl. Abve	
							VRF Heat Pump; 14tn							Incl. Abve	
							VRF Heat Pump; 2tn							Incl. Abve	
							VRF Heat Pump; 1.5tn							Incl. Abve	
							VRF Fan Coil Unit; 6tnclg/81mbhgtg							Incl. Abve	
							VRF Fan Coil Unit; 4.5tnclg/60mbhgtg							Incl. Abve	
							VRF Fan Coil Unit; 4tnclg/54mbhgtg							Incl. Abve	
							VRF Fan Coil Unit; 2.5tnclg/34mbhgtg							Incl. Abve	
							VRF Fan Coil Unit; 2tnclg/27mbhgtg							Incl. Abve	
							VRF Fan Coil Unit; 1.5tnclg/20mbhgtg							Incl. Abve	
							Drip pan & Leak detection							Incl. Abve	
							Branch Controller							Incl. Abve	
		D30		23 82 33 Convectors										Incl. Abve	
							Trench heater							Incl. Abve	
		D30		23 82 36 Finned-Tube Radiation Heaters										Incl. Abve	
							Baseboard Heater 3kW							Incl. Abve	
		D30		23 82 39.16 Propeller Unit Heaters										Incl. Abve	
							Refer to Section 23 82 39.19							Incl. Abve	
		D30		23 82 39.19 Wall and Ceiling Unit Heaters										Incl. Abve	
							Wall Hung Heater							Incl. Abve	
		D30		23 84 13.23 Direct-Steam-Injection Humidifiers										Incl. Abve	
							Humidifier; 120lb/hr, 28,000cfm							Incl. Abve	
							Pipe							Incl. Abve	
		D30		23 84 16.16 Indoor, Mechanical Dehumidification Units										Incl. Abve	
							Indoor, Mechanical Dehumidification Units 14lb/hr							Incl. Abve	
							Indoor, Mechanical Dehumidification Units 9lb/hr							Incl. Abve	
							Condensate Pump							Incl. Abve	
							Pipe							Incl. Abve	
														Incl. Abve	
			copy above cell and insert copied cell above the row												
							DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) SUB TOTAL			**$ 1,570,988.00**	**$ 2,918,000.00**			**$ 4,488,988.00**	
			DIVISION 26 - ELECTRICAL												
		D50		26 00 10 Supplemental Requirements for Electrical										$ -	
		D50					260010 Electrical Systems	1.00	LS	$ 2,047,895.00	$ 3,803,000.00		$ 5,850,895.00	$ 5,850,895.00	
							Supplemental Requirements for Electrical							Incl. Abve	
							Vibration isolation/seismic restraint - included							Incl. Abve	
							Sleeves/firestopping - included							Incl. Abve	
							Testing/commissioning - included							Incl. Abve	
							Coordination w/other trades, material distribution, handlings - included							Incl. Abve	
							ID/Labeling							Incl. Abve	

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
							Temporary lighting							Incl. Abve	
							Condensate pump							Incl. Abve	
							Cabinet unit heater							Incl. Abve	
							Dehumidification unit							Incl. Abve	
							Baseboard heater							Incl. Abve	
							Elevator sump pump							Incl. Abve	
							Humidifier							Incl. Abve	
							Hot water circulating pump							Incl. Abve	
							Duplex domestic water booster pump							Incl. Abve	
							Duplex sewer ejector							Incl. Abve	
							Exhaust fan							Incl. Abve	
							VAV box							Incl. Abve	
							VRF heat recovery condensing unit							Incl. Abve	
							Roof top heat pump							Incl. Abve	
							Electric heat pump hot water heater							Incl. Abve	
							VRF fan coil unit							Incl. Abve	
							Roof top DOAS energy recovery							Incl. Abve	
							VRF split system							Incl. Abve	
							Trash compactor							Incl. Abve	
							Elevator - 40HP							Incl. Abve	
		D50		26 05 19 Low-Voltage Electrical Power Conductors and Cables										Incl. Abve	
							500 MCM							Incl. Abve	
							350 MCM							Incl. Abve	
							# 4/0 wire							Incl. Abve	
							# 3/0 wire							Incl. Abve	
							# 1/0 wire							Incl. Abve	
							# 2 wire							Incl. Abve	
							# 3 wire							Incl. Abve	
							# 4 wire							Incl. Abve	
							# 6 wire							Incl. Abve	
							# 8 wire							Incl. Abve	
							# 10 wire							Incl. Abve	
							# 12 wire							Incl. Abve	
							# 6 wire (exterior lighting)							Incl. Abve	
							# 10 wire (exterior lighting)							Incl. Abve	
							# 12 wire (exterior lighting)							Incl. Abve	
		D50		26 05 26 Grounding and Bonding for Electrical Systems										Incl. Abve	
							Grounding							Incl. Abve	
		D50		26 05 29 Hangers and Supports for Electrical Systems										Incl. Abve	
							Panel mounting assembly							Incl. Abve	
		D50		26 05 33.13 Conduits for Electrical Systems										Incl. Abve	
							4" conduit							Incl. Abve	
							3" RGS							Incl. Abve	
							3" conduit							Incl. Abve	
							2" conduit							Incl. Abve	
							1 1/4" conduit							Incl. Abve	
							1" conduit							Incl. Abve	
							3/4" conduit							Incl. Abve	
							Incoming service							Incl. Abve	
							4" PVC sch.40							Incl. Abve	
							500 MCM							Incl. Abve	
							Excavation/backfill/concrete encasement							Incl. Abve	
							Chargepoint Express 250 - EV station at side walk							Incl. Abve	
							1 1/4" PVC sch.40							Incl. Abve	
							# 4 wire							Incl. Abve	
							# 8 wire							Incl. Abve	
							Excavation/backfill (trenching)							Incl. Abve	
							1" RGS (exterior lighting)							Incl. Abve	
							3/4" RGS (exterior lighting)							Incl. Abve	
							Security System - empty conduit							Incl. Abve	
							3/4" RGS							Incl. Abve	
							3/4" conduit							Incl. Abve	
							Security System back-boxes							Incl. Abve	
							Camera, back-box							Incl. Abve	
							Card reader, back-box							Incl. Abve	
							Door contact, back-box							Incl. Abve	
							Electric lockset w/built-in request to exit, back-box							Incl. Abve	
							Motion sensor, back-box							Incl. Abve	
							Duress button, back-box							Incl. Abve	
							Intercom, back-box							Incl. Abve	
							Glass break, back-box							Incl. Abve	
							Keypad, back-box							Incl. Abve	
							Junction box							Incl. Abve	

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
							Audio Visual System back-boxes							Incl. Abve	
							Whiteboard, back-box							Incl. Abve	
							Flat panel display, back-box							Incl. Abve	
							Loudspeaker, back-box							Incl. Abve	
							Microphone, back-box							Incl. Abve	
							Projector, back-box							Incl. Abve	
							Projection screen, back-box							Incl. Abve	
							Touch panel, back-box							Incl. Abve	
							Junction box							Incl. Abve	
							Tel/Data System back-boxes							Incl. Abve	
							1 cable cat.6 outlet							Incl. Abve	
							2 cable cat.6 outlet							Incl. Abve	
							4 cable cat.6 outlet							Incl. Abve	
		D50		26 05 33.16 Boxes for Electrical Systems										Incl. Abve	
							Refer to Section 26 05 33.13 Conduits for Electrical Systems							Incl. Abve	
		D50		26 05 53 Identification for Electrical Systems										Incl. Abve	
							Refer to Section 26 00 10 Supplemental Requirements for Electrical							Incl. Abve	
		Z10		26 08 00 Commissioning of Electrical Systems										Incl. Abve	
							Commissioning of Electrical Systems							Incl. Abve	
		D50		26 09 23 Lighting Control Devices										Incl. Abve	
							Single pole light switch							Incl. Abve	
							Dimmer							Incl. Abve	
							Combination wall vacancy sensor/dimming switch							Incl. Abve	
							Motion sensor, ceiling mounted							Incl. Abve	
							Power pack							Incl. Abve	
							Occupancy sensor, wall mounted							Incl. Abve	
							Vacancy sensor, wall mounted							Incl. Abve	
		D50		26 22 13 Low-Voltage Distribution Transformers										Incl. Abve	
							75 KVA transformer							Incl. Abve	
		D50		26 24 13 Switchboards										Incl. Abve	
							3000 Amp switchboard							Incl. Abve	
		D50		26 24 16 Panelboards										Incl. Abve	
							800 Amp panel 208V							Incl. Abve	
							400 Amp panel 208V							Incl. Abve	
							200 Amp panel 208V, 2-sections							Incl. Abve	
							200 Amp panel 208V, 84-poles							Incl. Abve	
							100 Amp panel 208V							Incl. Abve	
		D50		26 27 13 Electricity Metering										Incl. Abve	
							Meter/CT cabinet							Incl. Abve	
		D50		26 27 16 Electrical Cabinets and Enclosures										Incl. Abve	
							Service end box							Incl. Abve	
		D50		26 27 26 Wiring Devices										Incl. Abve	
							Simplex receptacle							Incl. Abve	
							Duplex receptacle							Incl. Abve	
							GFI duplex receptacle							Incl. Abve	
							GFI duplex receptacle, WP							Incl. Abve	
							Quad receptacle							Incl. Abve	
							NEMA L6-20R receptacle							Incl. Abve	
							NEMA L6-30R receptacle							Incl. Abve	
							Scoreboard (F & I B.O.)							Incl. Abve	
							Motorized projection screen (F & B.O.)							Incl. Abve	
							Motorized projector (F & B.O.)							Incl. Abve	
							Retractable hoop (F & B.O.)							Incl. Abve	
							Hand dryer (F & B.O.)							Incl. Abve	
							Wire Mold Allowance							Incl. Abve	
		D50		26 28 13 Fuses										Incl. Abve	
							60 Amp NEMA 1 disconnect switch							Incl. Abve	
		D50		26 28 16 Enclosed Switches and Circuit Breakers - w/26 28 13										Incl. Abve	
							30 Amp NEMA 1 disconnect switch							Incl. Abve	
		D50		26 28 16 Enclosed Switches and Circuit Breakers - w/26 28 13										Incl. Abve	
							Enclosed Switches and Circuit Breakers - w/26 28 13							Incl. Abve	
		D50		26 31 00 Photovoltaic Collectors										Incl. Abve	
							Photovoltaic Collectors							Incl. Abve	
							327W solar panel (Sun Power SPR-E20-327-COM) - included							Incl. Abve	
							AC combiner - included							Incl. Abve	
							50 KW inverter (Sunny Tripower model CORE1 50-US) - included							Incl. Abve	
							Conduit and wire - included							Incl. Abve	
							Grounding - included							Incl. Abve	
							Conduit and wire - included							Incl. Abve	
							Tie-in to utility - included							Incl. Abve	
							"Solarmount" rail system rails, clips, clamps) - included							Incl. Abve	
							Testing/commissioning - included							Incl. Abve	
		D50		26 50 00 Lighting (take-off based on "A drawings)										Incl. Abve	

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
							Furnish only							Incl. Abve	
							Installation only							Incl. Abve	
							Lighting fixture type L01							Incl. Abve	
							Lighting fixture type L02							Incl. Abve	
							Lighting fixture type L03							Incl. Abve	
							Lighting fixture type L03A							Incl. Abve	
							Lighting fixture type L04							Incl. Abve	
							Lighting fixture type L05							Incl. Abve	
							Lighting fixture type L06							Incl. Abve	
							Lighting fixture type L07							Incl. Abve	
							Lighting fixture type L08							Incl. Abve	
							Lighting fixture type L08A							Incl. Abve	
							Lighting fixture type L09							Incl. Abve	
							Lighting fixture type L09A							Incl. Abve	
							Lighting fixture type L10							Incl. Abve	
							Lighting fixture type L12							Incl. Abve	
							Lighting fixture type L11 - track							Incl. Abve	
							Lighting fixture type L11 - heads							Incl. Abve	
							Lighting fixture type L11T							Incl. Abve	
							Lighting fixture type L13 - 4'							Incl. Abve	
							Lighting fixture type L13 - 8'							Incl. Abve	
							Lighting fixture type L13A							Incl. Abve	
							Lighting fixture type EX-03							Incl. Abve	
							Lighting fixture type EX-04							Incl. Abve	
							Lighting fixture type EX-05							Incl. Abve	
							1' x 4' industrial lighting fixture (water room)							Incl. Abve	
							Exit sign							Incl. Abve	
							Lighting Fixture LI-1							Incl. Abve	
							Lighting Fixture LI-2							Incl. Abve	
		G40		26 56 13 Lighting Poles and Standards										Incl. Abve	
							Lighting fixture, pole mounted (type EX-01) - 12'H							Incl. Abve	
							Concrete base							Incl. Abve	
							Concrete base							Incl. Abve	
							Excavation/backfill (trenching)							Incl. Abve	
							Excavation/backfill (base)							Incl. Abve	
							Rigging							Incl. Abve	
														Incl. Abve	
			copy above cell and insert copied cell above the row												
							DIVISION 26 - ELECTRICAL SUB TOTAL			**$ 2,047,895.00**	**$ 3,803,000.00**			**$ 5,850,895.00**	
			DIVISION 27 - COMMUNICATIONS												
		D60		27 00 10 Supplemental for Requirements for Communications										W/260010	
							Termination							W/260010	
							Testing/labeling - w/27 08 00							W/260010	
		D60		27 05 28 Pathways for Communication Systems										W/260010	
							Audio Visual System empty conduit							W/260010	
							1 1/4" conduit							W/260010	
							1" conduit							W/260010	
							Tel/Data System empty conduit							W/260010	
							4" RGS							W/260010	
							1" conduit							W/260010	
							4" conduit							W/260010	
							4" sleeve							W/260010	
							24" ladder rack							W/260010	
							18" ladder rack							W/260010	
							12" cable tray (wire mesh)							W/260010	
		D60		27 08 00 Commissioning of Communications										W/260010	
							Commissioning for Communications							W/260010	
		D60		27 11 00 Communications Equipment Room Fittings										W/260010	
							Equipment rack							W/260010	
							AV equipment cabinet							W/260010	
							Plywood backboard							W/260010	
							Grounding bus bar							W/260010	
							Vertical wire manager							W/260010	
							Horizontal wire manager							W/260010	
							48-port patch panel							W/260010	
							RJ-45 jack							W/260010	
		D60		27 15 13 Communications Horizontal Cabling										W/260010	
							Cable cat.6							W/260010	
							AV System devices, LV cable, testing - OFOI							W/260010	
							Assistive listening induction loop (Multipurpose Rooms) - included							W/260010	
														W/260010	
			copy above cell and insert copied cell above the row												
							DIVISION 27 - COMMUNICATIONS SUB TOTAL								

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
			DIVISION 28 - ELECTRONIC SAFETY AND SECURITY												
		D70		28 00 10 Supplemental Requirements for Electronic Safety and Security										W/260010	
							Testing							W/260010	
		D70		28 10 00 Access Control										W/260010	
							Access control server							W/260010	
							Access control panel							W/260010	
							Workstation							W/260010	
							Power supply							W/260010	
							Card reader							W/260010	
							Door contact							W/260010	
							Electric lockset w/built-in request to exit							W/260010	
							Keypad							W/260010	
							Duress button							W/260010	
							ADA push button							W/260010	
							Low voltage wire							W/260010	
		D70		28 13 00 Access Control System Software and Database Management System Software										W/260010	
							Software/ camera license							W/260010	
		D70		28 14 00 Access Control System Hardware - w/28 10 00										W/260010	
							Access Control System Hardware - w/28 10 00							W/260010	
		D70		28 15 00 Integrated Access Control Hardware Devices - w/28 10 00										W/260010	
							Integrated Access Control Hardware Devices - w/28 10 00							W/260010	
		D70		28 15 13 Access Control Credentials										W/260010	
							Access control card (HID Global) - allow							W/260010	
		D70		28 15 23 Intercom Entrance systems										W/260010	
							Master video intercom station							W/260010	
							Video intercom door station							W/260010	
		D70		28 20 00 Video Surveillance										W/260010	
							Video surveillance server							W/260010	
							Fixed camera							W/260010	
							360 deg. Camera							W/260010	
							180 deg. Camera							W/260010	
							180 deg. camera, WP							W/260010	
							Cable cat.6 - w/Division 27							W/260010	
		D70		28 31 00 Intrusion Detection										W/260010	
							Intrusion detection panel							W/260010	
							Motion sensor							W/260010	
							Duress button							W/260010	
							Glass break sensor							W/260010	
							LV wiring							W/260010	
		D70		28 46 21.11 Addressable Fire-Alarm Systems										W/260010	
							Fire alarm control panel							W/260010	
							Remote annunciator							W/260010	
							30 Amp NEMA 1 disconnect switch							W/260010	
							Manual pull station							W/260010	
							Strobe light							W/260010	
							Combination horn/strobe							W/260010	
							Smoke detector							W/260010	
							Tamper and waterflow switches							W/260010	
							Smoke detector, duct mounted							W/260010	
							Relay							W/260010	
							3/4" RGS							W/260010	
							3/4" conduit							W/260010	
							# 8 wire							W/260010	
							# 12 wire							W/260010	
							Programming/testing/fees							W/260010	
														W/260010	
			copy above cell and insert copied cell above the row												
							DIVISION 28 - ELECTRONIC SAFETY AND SECURITY SUB TOTAL								
			DIVISION 31 - EARTHWORK												
81		G10		31 00 00 Earthwork			SUB TOTAL	1.00	LS	$ 744,747.00	$ 1,893,253.00	$ 2,500,000.00	$ 5,138,000.00	$ 5,138,000.00	
														$ -	
														$ -	
							Excavation, to reduce levels, building incl detention tank, incl authorized disposal & fees, contaminated							Incl. Abve	
							Excavation, to reduce levels, site, incl authorized disposal & fees, contaminated							Incl. Abve	
		G10		31 09 00 Geotechnical Instrumentation and Monitor			Premium cost for rock excavation and disposal, building incl detention tank							Incl. Abve	
							Premium cost for rock excavation and disposal, site							Incl. Abve	
		G10		31 10 00 Site Clearing										Incl. Abve	
							Monitoring of earthwork							Incl. Abve	
														Incl. Abve	
							Site clearing							Incl. Abve	
							Silt fence incl maintenance, reinforced, 3' high min, dwg C102-1							Incl. Abve	
							Inlet protection incl maintenance, dwg C102-1							Incl. Abve	
							Construction fence w/rolling gate, 8' high							Incl. Abve	

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
							Construction entrance/exist rolling gate							Incl. Abve	
							Tree guard, timber, 2"x 2" planks, staked, approx 6' high, plastic mesh wrapped, dwg C102-6 - including dwg L-007							Incl. Abve	
							Tree protection fence, for groves, plastic mesh, 4'6" high, dwg L006-2 - w/above							Incl. Abve	
							Existing stone wall to be preserved and protected							Incl. Abve	
							Existing stone wall & pillar to be removed							Incl. Abve	
							Remove store existing bike rack (store on site)							Incl. Abve	
							Remove store existing parking meter (store on site)							Incl. Abve	
							Sawcut asphalt roadway - E Tremont							Incl. Abve	
							Remove asphalt roadway w/sub-base, dispose - E Tremont							Incl. Abve	
							Disconnect and cap all electrical, low voltage services, light poles, etc for demo							Incl. Abve	
							Disconnect and cap all plumbing services, manholes etc for demo							Incl. Abve	
							Sawcut concrete sidewalk - E Tremont							Incl. Abve	
							Remove concrete sidewalk w/curb & sub-base, dispose - E Tremont							Incl. Abve	
							Protect existing traffic sign							Incl. Abve	
							Protect existing electric vault & sewer manhole							Incl. Abve	
							Remove bike rack							Incl. Abve	
							Remove asphalt sidewalk w/curb & sub-base, dispose - park area							Incl. Abve	
							Premium, pavement removal within critical root zone, including attendance by arborist, dwg L-002							Incl. Abve	
							Remove, bike rack - w/above							Incl. Abve	
							Remove, store parking meter - w/above							Incl. Abve	
							Remove, chip & cart away, tree, 1" Diameter Breast-Height (DBH)							Incl. Abve	
							Remove, chip & cart away, tree, 2" Diameter Breast-Height (DBH)							Incl. Abve	
							Remove, chip & cart away, tree, 3" Diameter Breast-Height (DBH)							Incl. Abve	
							Remove, chip & cart away, tree, 5" Diameter Breast-Height (DBH)							Incl. Abve	
							Remove, chip & cart away, tree, 6" Diameter Breast-Height (DBH)							Incl. Abve	
							Remove, chip & cart away, tree, 15" Diameter Breast-Height (DBH)							Incl. Abve	
							Remove, chip & cart away, tree, 22" Diameter Breast-Height (DBH)							Incl. Abve	
							Remove, chip & cart away, tree, 26" Diameter Breast-Height (DBH)							Incl. Abve	
							Remove, chip & cart away, tree, 28" Diameter Breast-Height (DBH)							Incl. Abve	
							Remove continuous concrete bench							Incl. Abve	
							Remove stairs w/rails							Incl. Abve	
							Remove metal fence - allowance							Incl. Abve	
							Clear and grub site, remove shrubs, grass etc.							Incl. Abve	
							Premium, landscape removal, critical root zone, including attendance by arborist, dwg L-002							Incl. Abve	
							Remove underground sewer pipes, approx 8 to 12" dia, incl locate, excavate, removal, backfill & cap -							Incl. Abve	
							Remove manholes, incl excavate, removal, backfill							Incl. Abve	
							Remove catch basins, incl excavate, removal, backfill							Incl. Abve	
							Remove electrical box							Incl. Abve	
		G10		31 20 00 Earth Moving			Remove light posts							Incl. Abve	
							Remove underground cables, conduit etc, locate, excavate, removal, dispose, backfill							Incl. Abve	
														Incl. Abve	
							Rough & fine grading, across entire site							Incl. Abve	
		A90		31 23 19 Dewatering			Imported fill, site							Incl. Abve	
							Imported backfill, building							Incl. Abve	
82		A90		31 50 00 Excavation Support and Protection				1.00	LS	$ 228,400.00	$ 475,000.00	$ 50,000.00	$ 753,400.00	$ 753,400.00	
							Dewatering for basement and detention tank - allowance							Incl. Abve	
														Incl. Abve	
							Support of excavation, timber lagging, 14x89 pile etc, for the basement							Incl. Abve	
							Support of excavation, timber lagging, 14x89 pile etc, detention tank							Incl. Abve	
							Tie-back -80 kips							Incl. Abve	
							Tie-down TB-1 at conc button - 220kips							Incl. Abve	
							Concrete button 5' x 5' bearing on Class 1C rock or better							Incl. Abve	
							Stone pillow wall - concrete step foundation, 48"x 36" high, w/4"x 4" continuous lip at front edge, detail FO301-6							Incl. Abve	
		A10		31 62 16 Steel Piles			Stone pillow wall - compacted drainage aggregate wrapped in geotextile, w/perforated pipe, behind and below, detail L920 4-6							Incl. Abve	
							Stone pillow wall - solid stone, 4' long sections, 3' x 2' high, dowelled, detail L920 4-6, north plaza							Incl. Abve	
83		A10		31 62 16 Steel Piles			Steel Piles	57.00	EA	$ 199,500.00	$ 285,000.00	$ 45,000.00	$ 9,289.47	$ 529,500.00	
		A10		31 68 00 Foundation Anchors										$ -	
							End bearing HP 10 x 42 piles, 80T - Assume 52 ft							Incl. Below	
														$ -	
							Rock dowel 1 1/2" diameter, 4" dia. hole							Incl. Below	
84		A10					Tie down anchors FO-506 - 100kip max length 20ft	24.00	EA	$ 72,000.00	$ 180,000.00	$ 60,000.00	$ 13,000.00	$ 312,000.00	
														$ -	
			copy above cell and insert copied cell above the row												
							DIVISION 31 - EARTHWORK SUB TOTAL			**$ 1,244,647.00**	**$ 2,833,253.00**	**$ 2,655,000.00**		**$ 6,732,900.00**	
			DIVISION 32 - EXTERIOR IMPROVEMENTS												
		G20		32 12 16 Asphalt Paving										W/ 310000	
							Asphalt pavement, 1 1/2" th asphalt top coarse, 1 1/2" th asphalt binder course, neoprene tack coat, compacted subgrade 12" th, E Tremont St, C104							W/ 310000	
							Asphalt pavement joint with existing, E Tremont St - included above							W/ 310000	
							Steel faced concrete curb, expansion joints, min 18" high, E Tremont St, C107-3							W/ 310000	
							Asphalt pavement, 1 1/2" th asphaltic concrete top coarse, 3" th asphaltic concrete binder course, 6" th average concrete base, neoprene tack coat, compacted subgrade, incl joint w/e							W/ 310000	
							Paint designated DOT parking places on E Tremont Ave, Dwg A-000 & striping at roadway patching							W/ 310000	
							DOT sign at designated (2) parking places on E Tremont Ave, Dwg A-000							W/ 310000	

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
							Reset existing traffic signs to existing locations - BPP-100 - note 7							W/ 310000	
		G20		32 13 13 Concrete Paving										W/ 310000	
							Concrete sidewalk, 4" th, 4000 psi, wwf, 6" crushed aggregate base, expansion joints, C108, E Tremont St - C104							W/ 310000	
							Concrete CIP footing, base, sidewall at north plaza, 6" th, wwf, 6" crushed aggregate base, dwg L910							W/ 310000	
							Concrete CIP footing, base, sidewall at south plaza, 6" th, wwf, 6" crushed aggregate base, L921							W/ 310000	
							Concrete CIP footing, base, sidewall at south west plaza, 6" th, wwf, 6" crushed aggregate base, L921							W/ 310000	
							Concrete CIP footing, base, sidewall at East Tremont, 6" th, wwf, 6" crushed aggregate base, L921							W/ 310000	
							Concrete CIP footing, base, at site furnishing - benches and tables - L930							W/ 310000	
		G20		32 13 16 Decorative Concrete Paving										W/ 310000	
							Concrete flush curb w/expansion joints 20' ctrs, detail L910-1							W/ 310000	
		G20		32 13 73 Concrete Paving Joint Sealants										W/ 310000	
							Concrete sidewalk, joint with existing - E Tremont - w/sidewalk concrete							W/ 310000	
							Concrete sidewalk, expansion joints, 1/4" thk, BPP-100 & C-103 - w/sidewalk							W/ 310000	
		G20		32 14 00 Unit Paving										W/ 310000	
							Concrete unit pavers 3" th, various colors, stone dust bed 1" th, paver foundation material 5" th, detail L900-2							W/ 310000	
							Metal edge transition, 16" high, detail L900-5							W/ 310000	
							Concrete raised curb cip, north plaza steps, 4" x 14" high, detail L910-2							W/ 310000	
							Concrete curb at concrete pavers & asphalt, 4" x 14" high, detail L910-1							W/ 310000	
							Sand-blasted stone steps at north plaza, 6" th, w/natural riser face, tread 15" long, stainless steel dowels, mortar bed 1" th, detail L921							W/ 310000	
							Sand-blasted stone steps at south plaza, tread 15" long, 6" th, w/natural riser face, stainless steel dowels, mortar bed 1" th, detail L921							W/ 310000	
							Cast in place concrete steps at south plaza,							W/ 310000	
							Cast in place concrete steps at West plaza, - Tremont							W/ 310000	
							Gravel maintenance edge, decorative stone, 12"x 3" th, crushed stone wrapped in filter fabric, 8" th, detail L900-7							W/ 310000	
							Metal landscape edge, 16" high, - none shown							W/ 310000	
		G20		32 33 00 Site Furnishings										W/ 310000	
							Boulder, min 2' high, irregular shape, compacted aggregate base, in planting, detail L920-1							W/ 310000	
							Boulder, min 2'6" high, irregular shape, compacted aggregate base, stabilized stone screenings, sealant to match, in paving, detail L920-2							W/ 310000	
							Boulder, min 2'6" high, irregular shape, compacted aggregate base & side, stabilized stone screenings, on slope, detail L920-3							W/ 310000	
							Steel handrail at north plaza stair, core drilled at base, detail L910							W/ 310000	
							Steel handrail at south plaza stair, core drilled at base, detail L910							W/ 310000	
							Steel handrail at south plaza stair, core drilled at base, detail L910							W/ 310000	
							Steel handrail at East Tremont, core drilled at base, detail L910							W/ 310000	
							1964 World's Fair bench, 8' long, bolted to concrete foundation, detail L930-3							W/ 310000	
							1964 World's Fair bench, 4' long, bolted to concrete, detail L930-3							W/ 310000	
							Table, metal, 3'10" x 3'10" wide, w/3 bench seats, bolted to concrete foundation, detail L930-2							W/ 310000	
							Reinstall salvaged parking meter w/base							W/ 310000	
							Bike rack, re-install							W/ 310000	
		G20		32 91 13 Soil Preparation										$ -	
							Mulch at planting areas, 3" th							W/ 0329300	
							Planting soil, at planting areas, 15" th							W/ 0329300	
							Planting soil, at grass areas, 15" th - disturbed area							W/ 0329300	
		G20		32 92 00 Turf and Grasses										W/ 0329300	
							Grass w/loam							W/ 0329300	
							Restore existing \disturbed lawn							W/ 0329300	
85		G20		32 93 00 Plants						$ 230,265.00	$ 515,000.00			$ 745,265.00	
							Trees AR: October Glory Red Maple, 5 cal, B&B							Incl. Abv	
							Trees CC: Eastern Redbud, 8-10' high, B&B							Incl. Abv	
							Trees CF: Cherokee Princess Dogwood, 6-8' high, B&B							Incl. Abv	
							Trees IO: Greenleaf American Holly, 6-8' high, B&B							Incl. Abv	
							Trees MV: Sweetbay Magnolia, 6-8' high, B&B							Incl. Abv	
							Trees PS: White Pine, 8-10' high, B&B							Incl. Abv	
							Trees QR: Northern Red Oak, 5 cal, B&B							Incl. Abv	
							Trees TA: Redmond American Linden, 5 cal, B&B							Incl. Abv	
							Trees TC: Greenspire Littleleaf Linden, 5 cal, B&B							Incl. Abv	
							Shrub AM: Black Chokeberry, 3 gal, 24" o.c.							Incl. Abv	
							Shrub CR: Red Twig Dogwood, 3 gal, 24" o.c.							Incl. Abv	
							Shrub HQ: Oakleaf Hydrangea, 3 gal, 24" o.c.							Incl. Abv	
							Shrub IG: Shamrock Inkberry Holly, 5 gal, 24" o.c.							Incl. Abv	
							Shrub LB: Spicebush, 3 gal, 24" o.c.							Incl. Abv	
							Shrub PL: Otto Luyken English Laurel, 3 gal, 24" o.c.							Incl. Abv	
							Shrub RA: Gro-lo Fragrant Sumac, 3 gal, 24" o.c.							Incl. Abv	
							Groundcover CL: Northern Sea Oats, 2 gal, 12" o.c.							Incl. Abv	
							Groundcover LC: Creeping Lily Turf, 2 gal, 12" o.c.							Incl. Abv	
							Groundcover NF: Cat Mint, 2 gal, 12" o.c.							Incl. Abv	
							Groundcover PT: Japanese Pachysandra, 2 gal, 12" o.c.							Incl. Abv	
							Groundcover SR: Fireworks Wrinkleleaf Goldenrod, 3 gal, 24" o.c.							Incl. Abv	
							Premium, landscape work, critical root zone, dwg L-002 - w/above							Incl. Abv	
							Provide all required planting maintenance, repairs or replacements for a period of Two years from Date of Substantial Completion - trees, shrubs, ground cover & other plants, item 1.11							Incl. Abv	
														Incl. Abv	
			copy above cell and insert copied cell above the row												
							DIVISION 32 - EXTERIOR IMPROVEMENTS SUB TOTAL			**$ 230,265.00**	**$ 515,000.00**			**$ 745,265.00**	
			DIVISION 33 - UTILITIES												

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

No.	Sub Work (*)	UniFormat Code	CSI Division:	CSI Sub Division:	RSMeans 12-digit item code:	Vendor Quote (Yes/ No):	Description:	Qty	Unit:	Total Cost of Material $	Total Cost of Labor $	Total Cost of Equipment $	Unit Cost	Total Cost of Material, Labor & Eqp.$	COMMENTS:
								A		B	C	D	E / A	E = B+C+D	
		G30		33 14 15 Site Water Distribution Piping										$ -	
							Water ductile iron pipe, 4" dia incl excavation/backfill							Incl. Below	
							Connection to existing 12" water main incl street valve							Incl. Below	
							Fire ductile iron pipe, 6" dia incl excavation/backfill							Incl. Below	
							Connection to existing 12" water main incl street valve							Incl. Below	
							Sanitary ductile iron pipe, 6" dia incl excavation/backfill							Incl. Below	
							Connection to existing sewer main, 18" combined sewer							Incl. Below	
		G30		33 42 00 Stormwater Conveyance										Incl. Below	
							Storm ductile iron pipe, 6' dia, incl excavation/backfill							Incl. Below	
							Storm manhole, 5'10" dia, including Park's Leaf manhole cover, excavation & backfill, detail C-108/1							Incl. Below	
							Storm drop outlet, 4'4" dia, including grate, excavation & backfill, detail C-108/3							Incl. Below	
							Storm catch basin, 2'0"x1'6" wide, including grate, excavation & backfill, detail C-108/4							Incl. Below	
							Storm cleanout							Incl. Below	
							Area drain, 4' x 2' wide							Incl. Below	
							Trench drain w/grating							Incl. Below	
							Connection to existing drains (east & south), including resetting							Incl. Below	
							Connection to existing combined main, 18" dia							Incl. Below	
							Reset existing rim							Incl. Below	
							Stormwater detention tank, precast, manhole cover (4), access hatch (1), 78' x 20.5' x 9.07' high, dwg C107							Incl. Below	
86		G20		33 00 00 Utilities			Site Utilities	1.00	LS	$ 680,000.00	$ 713,700.00	$ 872,300.00	$ 2,266,000.00	$ 2,266,000.00	
							Electrical							Incl Abv	
							Reset street lights to new grade - note 9: - BPP-100							Incl Abv	
														Incl Abv	
			copy above cell and insert copied cell above the row												
							DIVISION 33 - UTILITIES SUB TOTAL			**$ 680,000.00**	**$ 713,700.00**	**$ 872,300.00**		**$ 2,266,000.00**	
							Hard Cost (without General Requirement):			**$ 15,901,516.00**	**$ 28,259,764.00**	**$ 4,545,659.00**		**$ 48,706,939.00**	
							Total Cost Summary (Including General Requirement):			**$ 21,920,012.00**	**$ 31,215,129.00**	**$ 4,670,659.00**		**$ 57,805,800.00**	☑ Value Matches SOV Summary

Note:
1. Schedule of Value (SOV) Detail: This template provides a detailed SOV line items in CSI Master Format.
2. Quantity includes expected material wastage
3. Sub Work(*) - Identify possible Sub Contract Work items
4. Shaded cell is where data must be entered

FMS/Project ID: P-1TREREC
Project Name: Walter Gladwin Recreation Center Borough of The Bronx
Contractor: Andron Construction Corp.

BREAKDOWN						
Item#	**CSI SUB DIVISION:**	**DESCRIPTION OF WORK**	**QUANT**	**UNIT**	**UNIT COST**	**TOTAL COST INCLUDING MARK-UP**
A -General Requirement Unit Price Items						
1	01 50 00	3.4.F:Temporary Electrical Service	32.00	MO	$ 4,687.50	$ 150,000.00
2	01 50 00	3.5.K:Temporary Heat	38.00	MO	$ 1,000.00	$ 38,000.00
3	01 50 00	3.8.F:Field Office	38.00	MO	$ 1,315.79	$ 50,000.02
4	01 50 00	3.14.H:Rodent and Insect Control	32.00	MO	$ 650.00	$ 20,800.00
5	01 50 00	3.18.D:Security Guards	32.00	MO	$ 5,937.50	$ 190,000.00
6	01 54 23	1.9:Sidewalk sheds	32.00	MO	$ 13,762.50	$ 440,400.00
copy directly above cell and insert copied cell above the row						
		A - TOTAL UNIT PRICE::			Value Matches SOV Summary	**$ 889,200.02**
B -Contract Allowance						
1		Unit Prices for Div 01 work	1.00	LS	$ 889,200.02	See Abv Lines 1 - 6
2		ALLOWANCE for Expanded Work (Section 012200 of the DDC General Conditions)	1.00	LS	$ 3,275,000.00	$ 3,275,000.00
3		ALLOWANCE for Incidental Asbestos Abatement (Section 028013 of the Specifications)	1.00	LS	$ 15,000.00	$ 15,000.00
4		ALLOWANCE for Tree Restitution	1.00	LS	$ 1,500,000.00	$ 1,500,000.00
5						
6						
copy directly above cell and insert copied cell above the row						
		B - TOTAL UNIT PRICE(ALLOWANCE):			Value Matches SOV Summary	**$ 4,790,000.00**
C -Unit Price Schedule Items						
1						
2						
3						
4						
5						
6						
copy directly above cell and insert copied cell above the row						
		C - TOTAL UNIT PRICE::			Value Matches SOV Summary	**$ -**

TOTAL (A.+B.+C.):	Value Matches SOV Summary $ 5,679,200.02

Note:

1. Unit price includes Overhead and Profit, Escalation and Bidders Risk

FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS. That we, Andron Construction Corp., 21 Anderson Lane, Goldens Bridge, NY 10526

hereinafter referred to as the "Principal", and Liberty Mutual Insurance Company, 175 Berkeley Street, Boston, MA 02116

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

Ten Percent of the Proposal Price

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

Whereas, the Principal is about to submit (or has submitted) to the City the accompanying proposal, hereby made a part hereof, to enter into a contract in writing for FMS #: P-1TREREC,

Walter Gladwin Recreation Center, 550 East Tremont Avenue, Bronx, NY 10457,

Contract No. 1 - General Construction Work,

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

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

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

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

QUALIFICATION FORM

project 1

Name of Contractor: Andron Construction

Name of Project: NYS Parks /Philipse Manor Hall

Location of Project: Yonkers NY

Owner or Owner's representative (Architect or Engineer) who is familiar with the work performed:

Name: Anthony Martini RA

Title: Senior Associate, Saratoga Associates Phone Number: (518) 587-2550

Brief description of the Project completed or the Project in progress: completed

1600s manor house: interior and exterior rehabilitation and site enhancements, plus construction of 2-story addition for elevator and restrooms. Renovation includes interior and exterior architectural restoration projects; new electrical, information technology, security & fire detection systems; improved landscaping, lighting, parking and walkways; new seating areas, plantings & shade trees; ADA accessibility improvements.

Was the Project performed as a prime, a subcontractor or a sub-subcontractor: prime

Amount of Contract, Subcontract or Sub-subcontract: Contract: $9,590,015

Start Date and Completion Date: start 11/28/2021 • finish 10/18/2022

****

project 2

Name of Contractor: Andron Construction

Name of Project: Parkchester Gardens

Location of Project: Bronx NY

Owner or Owner's representative (Architect or Engineer) who is familiar with the work performed:

Name: Beth Greenberg FAIA

Title: Partner, Dattner Architects Phone Number: (212) 247-2660

Brief description of the Project completed or the Project in progress: completed

30,000 SF senior housing project adjacent to the Parkchester complex in the Bronx, providing affordable senior housing with on-site activities and supportive services. New construction of 8-story block-and-plank structure with brick façade and outdoor hardscaping. 220 units: kitchen and bath apartments, with common space amenities on 1st floor. Common space cooled & heated by rooftop AHUs, generator, and solar panels.

Was the Project performed as a prime, a subcontractor or a sub-subcontractor: prime

Amount of Contract, Subcontract or Sub-subcontract: Contract: $71,225,378

Start Date and Completion Date: start 01/04/2021 • finish 08/10/2023

QUALIFICATION FORM

project 3

Name of Contractor: Andron Construction

Name of Project: Grow NYC /NYS Regional Food Hub

Location of Project: Bronx NY

Owner or Owner's representative (Architect or Engineer) who is familiar with the work performed:

Name: Marcel Van Ooyen

Title: President & CEO, Grow NYC Phone Number: (212) 788-7900

Brief description of the Project completed or the Project in progress: completed

Interior fit-out: site work and new construction of a 60,427 SF pre-engineered cold storage facility building to host wholesale distribution of locally grown fruits and vegetables, connecting local upstate farmers with local communities. Sustainable features of the building include a green roof with rainwater collection systems, permeable pavement, electric composting, daylighting, and photovoltaic power generation.

Was the Project performed as a prime, a subcontractor or a sub-subcontractor: prime

Amount of Contract, Subcontract or Sub-subcontract: Contract: $8,489,469

Start Date and Completion Date: start 01/20/2023 • finish 10/31/2024

****

project 4

Name of Contractor: Andron Construction

Name of Project: NYS Parks /Sojourner Truth State Park

Location of Project: Kingston NY

Owner or Owner's representative (Architect or Engineer) who is familiar with the work performed:

Name: Trevor Saksa

Title: Project Manager, NYS Parks Phone Number: (845) 889-3851

Brief description of the Project completed or the Project in progress: in progress

Comprehensive facility and infrastructure improvements: renovations to the administration building, maintenance and operation building, swimming pavilion, and pay booth. Utilities upgrades include potable water system, septics, electrical, communications, HVAC/ Mechanical, geothermal. Site improvements include vehicular and pedestrian paving.

Was the Project performed as a prime, a subcontractor or a sub-subcontractor: prime

Amount of Contract, Subcontract or Sub-subcontract: Contract: $14,521,000

Start Date and Completion Date: start 05/09/2025 • finish 08/07/2027

QUALIFICATION FORM

project 5

Name of Contractor: Andron Construction

Name of Project: ASPCA /Recovery & Rehabilitation Center

Location of Project: Pawling NY

Owner or Owner's representative (Architect or Engineer) who is familiar with the work performed:

Name: Tom Turner AIA

Title: Senior Project Architect, HLW Phone Number: (212) 353-4600

Brief description of the Project completed or the Project in progress: completed

new 50,000 SF facility to provide medical and behavioral care for canine victims of suspected cruelty and neglect. Intended to care and promote healing from injuries and illness, design elements include interactive indoor and outdoor kennels, sound-absorbing materials, and 'real life rooms' to simulate home environments. The facility also houses a veterinary clinic with in-house diagnostic and imaging capabilities along with surgical and dental suites.

certified LEED-Gold

Was the Project performed as a prime, a subcontractor or a sub-subcontractor: prime

Amount of Contract, Subcontract or Sub-subcontract: Contract: $29,341,993

Start Date and Completion Date: start 09/18/2023 • finish 10/29/2025

****

project 6

Name of Contractor: Andron Construction

Name of Project: NYS OGS /Fishkill Correctional Facility

Location of Project: Beacon NY

Owner or Owner's representative (Architect or Engineer) who is familiar with the work performed:

Name: Pierre Alric, Jr.

Title: Contract Management Phone Number: (518) 474-0201

NYS Office of General Services /Design Construction

Brief description of the Project completed or the Project in progress: completed

Kitchen and Mess Hall rehabilitation for the New York State Office of General Services. 37,000 SF scope of work includes renovation of existing kitchen and dining facilities of maximum security prison, completed in six phases. The current kitchen and mess hall were occupied by the inmates and remain operational, occupied, and secured throughout the course of the project. Contract time was extended due to additional owner-directed work.

Was the Project performed as a prime, a subcontractor or a sub-subcontractor: prime

Amount of Contract, Subcontract or Sub-subcontract: Contract: $18,628,599

Start Date and Completion Date: start 12/07/2015 • finish 01/31/2022

QUALIFICATION FORM

project 7

Name of Contractor: Andron Construction

Name of Project: Caramoor Center for Music & the Arts /Master Plan

Location of Project: Katonah NY

Owner or Owner's representative (Architect or Engineer) who is familiar with the work performed:

Name: Bill Cordiano

Title: Board Member, Caramoor Phone Number: (914) 232-5035

Brief description of the Project completed or the Project in progress: completed

2016 Rosen House – renovations & restoration to public restrooms plus handicap ramp
2017 Rosen House – new materials lift and partial renovation of commercial kitchen
2019 Rosen House /Music Room HVAC – new climate control system in historical space
2020 Visitor Experience /Friends Field – campus-wide site improvements
2021 Friends Field /Band Shell – timber-framed outdoor music venue

certified LEED-Gold

Was the Project performed as a prime, a subcontractor or a sub-subcontractor: prime

Amount of Contract, Subcontract or Sub-subcontract: Contract: $5,368,821 total

Start Date and Completion Date: start December 2015• finish June 2021

****

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

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

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

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

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers the 22nd day of January, 2026.

(Seal)

Andron Construction Corp. (L.S.)
Principal

By: _____
MATTHEW WINTER, Senior V.P.

(Seal)

Liberty Mutual Insurance Company
Surety

By: Desiree Cardlin
Desiree Cardlin, Attorney-In-Fact

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION

State of NEW YORK County of WESTCHESTER ss:
On this 27th day of JANUARY, 2026, before me personally came MATTHEW WINTER to me known, who, being by me duly sworn, did depose and say that he/she/they resides at
21 ANDERSON LANE, GOLDENS BRIDGE, NY 10526
that he/she/they is the SENIOR VICE PRESIDENT of
Andron Construction Corp.
the corporation described in and which executed the foregoing instrument; that he/she/they knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation, and that he/she/they signed his name thereto by like order.

JOEL F. FOLEY
STATE OF NEW YORK
NOTARY PUBLIC
Qualified in Dutchess County
01F06413634
MY COMMISSION EXPIRES 02/01/2029

Notary Public

ACKNOWLEDGMENT OF PRINCIPAL, IF A PARTNERSHIP

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

_____

Notary Public

ACKNOWLEDGMENT OF PRINCIPAL, IF AN INDIVIDUAL

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

_____

Notary Public

AFFIX ACKNOWLEDGMENTS AND JUSTIFICATION OF SURETIES

POWER OF ATTORNEY

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

Certificate No: **8213933-969603**

KNOWN ALL PERSONS BY THESE PRESENTS: That The Ohio Casualty Insurance Company is a corporation duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Camille Maitland; Colette R. Chisholm; Dana Granice; Desiree Cardlin; George O. Brewster; Gerard S. Macholz; Karolynne Ramirez; Katherine Acosta; Lee Ferrucci; Louis J. Spina; Michelle Wannamaker; Nelly Renchiwich; Peter F. Jones; Robert T. Pearson; Susan Lupski; Thomas Bean; Vincent A. Walsh

all of the city of Uniondale state of NY each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 29th day of April, 2025.

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

By: Nathan J. Zangerle, Assistant Secretary

State of PENNSYLVANIA
County of MONTGOMERY ss

On this 29th day of April, 2025 before me personally appeared Nathan J. Zangerle, who acknowledged himself to be the Assistant Secretary of Liberty Mutual Insurance Company, The Ohio Casualty Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.

Commonwealth of Pennsylvania - Notary Seal
Teresa Pastella, Notary Public
Montgomery County
My commission expires March 28, 2029
Commission number 1126044
Member, Pennsylvania Association of Notaries

By: Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

ARTICLE IV – OFFICERS: Section 12. Power of Attorney.
Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and execution of any such instruments and to attach thereto the seal of the Corporation. When so executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

ARTICLE XIII – Execution of Contracts: Section 5. Surety Bonds and Undertakings.
Any officer of the Company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Company by their signature and execution of any such instruments and to attach thereto the seal of the Company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

Certificate of Designation – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes Nathan J. Zangerle, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 22nd day of January, 2026.

By: Renee C. Llewellyn, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

For bond and/or Power of Attorney (POA) verification inquiries, please call 610-832-8240 or email HOSUR@libertymutual.com.

ACKNOWLEDGEMENT OF SURETY COMPANY

STATE OF NEW YORK

COUNTY OF NASSAU

On this January 22, 2026, before me personally came Desiree Cardlin to me known, who, being by me duly sworn, did depose and say; that he/she resides in Suffolk County, State of New York that he/she is the Attorney-In-Fact of the Liberty Mutual Insurance Company

the corporation described in which executed the above instrument; that he/she knows the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that is was so affixed by the Board of Directors of said corporation; and that he/she signed his/her name thereto by like order; and the affiant did further depose and say that the Superintendent of Insurance of the State of New York, has, pursuant to Section 1111 of the Insurance Law of the State of New York, issued to Liberty Mutual Insurance Company (Surety) his/her certificate of qualification evidencing the qualification of said Company and its sufficiency under any law of the State of New York as surety and guarantor, and the propriety of accepting and approving it as such; and that such Certificate has not been revoked.

Notary Public

DANA GRANICE
Notary Public, State of New York
No. 01GR6099128
Qualified in Nassau County
Commission Expires 09/22/2027

LIBERTY MUTUAL INSURANCE COMPANY

FINANCIAL STATEMENT – DECEMBER 31, 2024

Assets	
Cash and Bank Deposits	$4,608,826,756.00
*Bonds – U.S Government	$4,281,375,446.74
*Other Bonds	$21,566,489,527.26
*Stocks	$15,589,644,012.00
Real Estate	$86,497,925.00
Agents' Balances or Uncollected Premiums	$7,512,975,129.00
Accrued Interest and Rents	$225,249,712.00
Other Admitted Assets	$19,367,663,200.00
Total Admitted Assets	**$74,539,483,661.00**

Liabilities	
Unearned Premiums	$9,890,896,878.00
Reserve for Claims and Claims Expense	$29,467,071,865.00
Funds Held Under Reinsurance Treaties	$341,948,172.00
Reserve for Dividends to Policyholders	$954,025.00
Additional Statutory Reserve	$150,547,865.00
Reserve for Commissions, Taxes and Other Liabilities	$5,049,906,410.00
Total	**$47,104,416,171.00**
Special Surplus Funds	$174,153,086.00
Capital Stock	$10,000,075.00
Paid in Surplus	$13,209,595,772.00
Unassigned Surplus	$13,415,980,561.00
Surplus to Policyholders	$27,435,067,490.00
Total Liabilities and Surplus	**$74,539,483,661.00**

* Bonds are stated at amortized or investment value; Stocks at Association Market Values.
The foregoing financial information is taken from Liberty Mutual Insurance Company's financial statement filed with the Massachusetts Department of Insurance.

I, TIM MIKOLAJEWSKI, Assistant Secretary of Liberty Mutual Insurance Company, do hereby certify that the foregoing is a true, and correct statement of the Assets and Liabilities of said Corporation, as of December 31, 2024, to the best of my knowledge and belief.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Corporation at Seattle, Washington, this 8th day of March, 2025.

LIBERTY MUTUAL INSURANCE COMPANY INCORPORATED 1912 MASSACHUSETTS

Timothy A. Mikolajewski

Timothy A. Mikolajewski, Assistant Secretary

LMS-1262/LMIC

Project References

A. Contracts completed by the bidder

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

Project & Location	Contract Type	Contract Amount ($000)	Date Completed	Owner Reference & Tel. No.	Architect/Engineer Reference & Tel. No. (if different from owner)
ASPCA /Recovery & Rehabilitation Center Pawling NY	CM/GMP	$29,341,993	10/29/2025	David Alvarado, Director, Real Estate & Capital Projects 212-876-7700	Animal Arts Heather E. Lewis, AIA 303-444-4413
The Harvey School /Weil House & Barn Katonah NY	CM/GMP	$9,496,188	08/29/2025	Alex Brooks Barr, Director of Finance & Operations 914-232-3161	Matt Gironda, P.E. Bibbo Associates 914-277-5805 x316
Rippowam Cisqua School /Learning Lab Bedford NY	CM	$7,648,657	08/28/2025	Jordan Vogel, Board Member 917-225-8844	KG+D Architects Erik Kaeyer, Principal 914-666-5900
Saint Joseph's Medical Center /ER Renovations FEE Yonkers NY	GC	$659,736	03/31/2025	Mark McConkey, CHFM 914-378-7499	Pallante Design Dominic Termini, AIA 973-494-9001 x3
The Osborn /Social Lounge Rye NY	GC	$1,061,826	12/02/2024	Bill Dadlani, VP Facilities & Property 914-925-8227	KDA Architects Danielle Magnotta, AIA 856-770-1060
NYS Regional Food Hub /Grow NYC Bronx NY	GC	$8,489,469	10/15/2024	Marcel Van Ooyen, President & CEO 212-788-7900	BLD Architecture Michael Messina 631-580-2100
West Point Association of Graduates /Egner Hall Renovation West Point NY	CM	$6,438,767	04/11/2024	Anthony LaRoche, Construction PM 845-849-4952	MBTA Architecture Claire Donato, AIA 215-985-1000
Cabrini of Westchester /Pantry & Dining Dobbs Ferry NY	GC	$2,606,983	12/19/2023	Bonnie Burke, VP of Operations 914-693-6800	Landow & Landow Marc Landow 516-326-1111
PPC Purdy LLC c/o Olshan Properties /Parkchester Gardens Bronx NY	GC	$71,672,283	08/10/2023	Adam Schwartz. O'Connor Capital 212-308-7700	Dattner Architects Beth Greenberg 212-247-2660
NYS Office of General Services /Fishkill Correctional Center	GC	$18,628,599	01/31/2022	Pierre Alrich Jr., Acting Director, Division of Contract 518-474-0201	Trautman Associates James Radwan, AIA 716-883-4400

Project References

B. Contracts currently under construction by the bidder

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

Project & Location	Contract Type	Contract Amount ($000)	Subcontracted to Others ($000)	Uncompleted Portion ($000)	Date Scheduled to Complete	Owner Reference & Tel. No.	Architect/Engineer Reference & Tel. No. (if different from owner)
Bet Torah /Renovations Mount Kisco NY	CM/GC	$4,126,005	$3,555,102	$4,126,005	08/2026	Seth Young, Executive Director 914-666-7595	KG+D Architects Erik Kaeyer, Principal 914-666-5900
Village of Ossining /Multi-Modal Ossining NY	GC	$15,999,999	$12,822,061	$14,758,489	07/2026	Dorian DeLaurentiis, Calgi Construction 914-447-3970	THA Consulting, Inc. Reginald Piggee Jr. AIA 484-342-0200
United Hebrew /4 Chair Hemodialysis Den Bedford NY	CM/GC	$274,422	$113,037	$58,466	03/2026	Rita Mabli, CEO 914-632-2804	Schopfer Architects LLP Susan Lepak, AIA 315-474-6501
Saint Joseph's Medical Center /ER Dept Entrance Yonkers NY	GC	$1,012,759	$653,250	$985,052	03/2026	Mark McConkey, CHFM 914-378-7499	Pallante Design Dominic Termini, AIA 973-494-9001 x3
Saint Joseph's Medical Center GMP Yonkers NY	GC	$10,596,114	$7,229,075	$5,496,856	05/2026	Mark McConkey, CHFM 914-378-7499	Pallante Design Dominic Termini, AIA 973-494-9001 x3
Orange Ulster BOCES – Arden Hill	GC	$9,939,000	$7,300,236	$6,135,311	05/2026	Scott Butler, The Palombo Group 845-868-1239	KG+D Architects Erik Kaeyer, Principal 914-666-5900
Ulster County Government Operations Center	GC	$9,355,000	$5,500,754	$5,916,701	08/2026	Tom Chesser, The Palombo Group 845-868-1239	Urbahn Architects Christopher Young, AIA 212-239-0220
NYS Parks /Sojourner Truth State Park NY	GC	$14,521,000	$8,484,268	$11,694,350	05/2027	Trevor Saksa, Project Manager 845-889-3851	Field Operations Colin Curley 603-219-3820

Project References

C. Pending contracts not yet started by the bidder

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

Project & Location	Contract Type	Contract Amount ($000)	Date Scheduled to Start	Owner Reference & Tel. No.	Architect/Engineer Reference & Tel. No. (if different from owner)
NYS OGS /Provide Imaging Bay Bldg 35 Orangeburg NY	GC	$10,686,000	TBD	Henry Grullon, NYS OGS, Contract Management Specialist 1 518-457-0698	Jack L. Gordon Architects Wook Kang 212-279-0550 Ext 123

Department of Design and Construction

PROJECT ID: **P-1TREREC**

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

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

VOLUME 2 OF 3

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

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

Walter Gladwin Recreation Center

LOCATION: **550 East Tremont Avenue**
BOROUGH: **Bronx, NY 10457**
CITY OF NEW YORK

CONTRACT NO. 1 **GENERAL CONSTRUCTION WORK**

NYC Department of Parks and Recreation

Marvel Architect

Date: **August 15, 2025**

NOTICE TO BIDDERS

This contract is subject to a new 2025 Project Labor Agreement

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

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

Bidders are advised that the City of New York and City agencies have entered into multiple PLAs. The terms of each PLA, while similar, are not identical. Please also note that there are revisions between the 2025 NYC Agency Citywide New Construction & Renovation PLA attached to this bid and the prior 2020 NYC Agency New Construction PLA, 2020 NYC Agency Renovation PLA, and 2021 DEP Renovation PLA.

All bidders are urged to review the entire 2025 NYC Agency Citywide New Construction & Renovation PLA prior to submitting a bid.

To the extent that the terms of the PLA conflict with any other terms of the invitation for bids, including the Standard Construction Contract, the terms of the PLA shall govern. For example, the PLA section that authorizes the scheduling of a four-day week, ten hours per day on straight time at the commencement of the job, PLA Article 12, Section 1(A), overrides the Standard Construction Contract's provision concerning a

five-day work week with a maximum of eight hours in a day, Standard Construction Contract Article 37.2.1. Where, however, the invitation for bids, including the Standard Construction Contract, requires the approval of the City/Department, the PLA does not supersede or eliminate that requirement.

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

This Contract is subject to Community Hiring Construction Careers and its requirements pursuant to Chapter 79 of the New York City Charter and the Community Hiring Rules adopted as Title 74 of the Rules of the City of New York. The Contractor shall agree to make best efforts to meet the Community Hiring Goal for at least 30% of cumulative labor hours of Program Work to be worked by Residence-Based Community Hires. At least 30% of such Residence-Based Community Hires labor hours are to be worked by apprentices.

If this Contract is subject to the Minority-Owned and Women-Owned Business Enterprise ("M/WBE") program implemented pursuant to New York City Administrative Code § 6-129, the specific requirements of M/WBE participation for this Contract are set forth elsewhere in this bid package.

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

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

2025 Agency Citywide New Construction & Renovation PLA
Frequently Asked Questions

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

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

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

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

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

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

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

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

5. **Q.** Does the PLA contain special provisions for MWBE or DBE subcontractors?

   A. On contracts valued at $25,000,000 or more where participation goals are set forth in the contract, the PLA does not apply to up to 7% of the value of the construction work under the contract provided the construction work is performed by certified MWBE or DBE subcontractors and such MWBE or DBE subcontractor is not a signatory to any Schedule "A" agreement ("Exempt Work"). Such Exempt Work shall be no more than $500,000 or 20% (whichever is greater) of the value of the subcontracts for work in any particular union's jurisdiction under any prime contract. See PLA Article 3, Section 1.

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

   A. Generally, labor will be referred to the Contractor from the respective signatory local unions. However, Contractors and subcontractors may use up to 12% of their existing, qualifying labor force for this work. Certified M/WBEs for which participation goals are set pursuant to NYC Administrative Code § 6-129 that are not signatory to any Schedule A collective bargaining agreements ("CBAs") with subcontracts valued at or under two million dollars ($2,000,000) and where the first two or more workers are hired simultaneously, may request by name, and the Local Union will honor, referral of the first (1st), fourth (4th), sixth (6th), and eighth (8th) Core Employee. In any case where the first two or more employees are not hired simultaneously, the certified MWBEs or DBEs Core Employees may be the second (2nd), fourth (4th), sixth (6th), and eighth (8th) Core Employee. Any additional workers will be referred to the Contractor in accordance with the 12% referral requirements set forth in the PLA. See PLA Article 4, Section 2.

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

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

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

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

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

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

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

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

    Non-union Contractors with bona fide private benefit plans that satisfy the requirements of Labor Law 220 will not be required to pay into union benefit funds for their employees working pursuant to Article 4, Section 2 (B) and (C) ("Core Employees") who are already covered under their bona fide private benefit plans. Supplemental benefit funds in excess of the annualized value of the private benefit plans will be paid directly to workers as additional wages in compliance with Labor Law § 220. At the time of contract award, the Contractor shall make available to the contracting Agency a complete set of plan documents for each private benefit plan into which contributions will be made and/or coverage provided. The Contractor shall also provide certification from a certified public accountant as to the annualized hourly value of such benefits consistent with the requirements of Labor Law § 220. See PLA Article 11, Section 2.

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

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

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

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

    Upon notification by a union or fringe benefit fund that a Contractor is delinquent in its payment of benefits and a determination by the Agency that the union or fund has submitted appropriate documentation of such delinquency, the Agency will thereafter require the Contractor to submit cancelled checks or other equivalent proof of payment of

benefit contributions with certified payroll reports for work covered by this PLA on which the Contractor is engaged.

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

13. **Q.** Does signing on to the PLA satisfy the Apprenticeship Directive Requirements established for this bid?

A. Yes. By agreeing to perform the Work subject to the PLA, the bidder demonstrates compliance with the apprenticeship requirements imposed by this Invitation for Bids.

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

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

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

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

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

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

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

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

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

A. All Stewards must be working Stewards (*i.e.*, they must be performing Program Work). In addition, Stewards may perform other tasks such as receiving complaints or grievances from other employees of the Steward's trade. Stewards may not determine

when overtime is worked. Stewards are entitled to the same wages as other employees of that trade. See PLA Article 5, Sections 2 and 3.

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

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

20. **Q.** What is Community Hiring Construction Careers?

A. As authorized under Section 3502 of the New York City Charter, Community Hiring Construction Careers is an initiative (superseding HireNYC Construction Careers) to advance career opportunities within the construction industry for those from economically disadvantaged communities. The initiative has a target goal of 30% of all hours worked on PLA projects to be performed by workers who reside in NYCHA housing or ZIP codes where 15% or more of the population lives below the poverty threshold, also know as "Residence-Based Community Hires." When a Contractor requests employees, the trades will take into account the target goals when they refer additional workers. To further encourage recruitment of new workers, Community Hiring Construction Careers has a goal that at least 30% of those hours are to be performed by apprentices who are Residence-Based Community Hires.

21. **Q.** Does the PLA provide a standard workday across all the signatory trades?

A. Yes, all signatory trades will work an eight (8) hour day, Monday through Friday with a day shift at straight time as the standard work week. For renovation and rehabilitation projects only, the PLA also permits a Contractor to schedule a four-day (within Monday through Friday) work week, ten (10) hours per day at straight time if announced at the commencement of the job. See PLA Article 12, Section 1. This is an example where the terms of the PLA override provisions of the Standard Construction Contract (compare with section 37.2 of the Standard Construction Contract). For renovation and rehabilitation projects only, the standard work week may be reduced to 35 or 37 ½ hours of work in those limited circumstances where the City states in the bid documents that the Contractor will not be given access to the site to accommodate an 8-hour day. The 8 hour, 7 ½ hour or 7-hour workday must be established at the commencement of the renovation and rehabilitation project by the Agency and may not be altered by the Contractor.

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

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

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

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

24. **Q.** Does the PLA provide for a standard policy for 'shift work' across all signatory trades?

A. Yes, for second and third shift work on work performed Monday – Friday on renovation and rehabilitation projects, there shall be a 5% shift premium, or the rate required by applicable prevailing wage laws, whichever is less. For second shift work on work performed Monday – Friday on new construction projects, there shall be a 10% shift premium, or the rate required by applicable prevailing wage laws, whichever is less. For third shift work on work performed Monday – Friday on new construction projects, there shall be a 15% shift premium, or the rate required by applicable prevailing wage laws, whichever is less. No other premium or other payments for such work shall be required unless such work is in excess of the employee's regularly scheduled work week. See PLA Article 12, Section 3.

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

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

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

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

27. **Q.** Are there special provisions for Saturday work when a day is 'lost' during the week due to weather, power failure or other emergency?

A. Yes, when this occurs the Contractor may schedule Saturday work at weekday rates. See PLA Article 12, Section 5.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PROJECT LABOR AGREEMENT
COVERING SPECIFIED NEW CONSTRUCTION, RENOVATION & REHABILITATION OF NEW YORK CITY OWNED BUILDINGS AND STRUCTURES

2025 – 2028

TABLE OF CONTENTS

ARTICLE 1 - PREAMBLE 1
SECTION 1. PARTIES TO THE AGREEMENT 2
ARTICLE 2 - GENERAL CONDITIONS 2
SECTION 1. DEFINITIONS 2
SECTION 2. CONDITIONS FOR AGREEMENT TO BECOME EFFECTIVE 5
SECTION 3. ENTITIES BOUND & ADMINISTRATION OF AGREEMENT 5
SECTION 4. SUPREMACY CLAUSE 6
SECTION 5. LIABILITY 7
SECTION 6. THE AGENCY 7
SECTION 7. AVAILABILITY AND APPLICABILITY TO ALL SUCCESSFUL BIDDERS 8
SECTION 8. SUBCONTRACTING 8
ARTICLE 3 - SCOPE OF THE AGREEMENT 8
SECTION 1. WORK COVERED 8
SECTION 2. TIME LIMITATIONS 12
SECTION 3. EXCLUDED EMPLOYEES 12
SECTION 4. NON-APPLICATION TO CERTAIN ENTITIES 14
ARTICLE 4 - UNION RECOGNITION AND EMPLOYMENT 14
SECTION 1. PRE-HIRE RECOGNITION 14
SECTION 2. UNION REFERRAL 15
SECTION 3. NON-DISCRIMINATION IN REFERRALS 17
SECTION 4. MINORITY, FEMALE, LOCAL AND SECTION 3 REFERRALS 17
SECTION 5. CROSS AND QUALIFIED REFERRALS 18
SECTION 6. CRAFT FOREPERSONS AND GENERAL FOREPERSONS 18
SECTION 7. ON CALL REPAIR REFERRALS 19
ARTICLE 5 - UNION REPRESENTATION 21
SECTION 1. LOCAL UNION REPRESENTATIVE 21
SECTION 2. STEWARDS 21

SECTION 3. LAYOFF OF A STEWARD 22
ARTICLE 6 - MANAGEMENT'S RIGHTS 22
SECTION 1. RESERVATION OF RIGHTS 22
SECTION 2. MATERIALS, METHODS & EQUIPMENT 23
ARTICLE 7 - WORK STOPPAGES AND LOCKOUTS 23
SECTION 1. NO STRIKES-NO LOCK OUT 23
SECTION 2. DISCHARGE FOR VIOLATION 24
SECTION 3. NOTIFICATION 24
SECTION 4. EXPEDITED ARBITRATION 25
SECTION 5. ARBITRATION OF DISCHARGES FOR VIOLATION 26
ARTICLE 8 - LABOR MANAGEMENT COMMITTEE 27
SECTION 1. SUBJECTS 27
SECTION 2. COMPOSITION 27
ARTICLE 9 - GRIEVANCE & ARBITRATION PROCEDURE 27
SECTION 1. PROCEDURE FOR RESOLUTION OF GRIEVANCES 27
SECTION 2. LIMITATION AS TO RETROACTIVITY 30
SECTION 3. PARTICIPATION BY AGENCY AND/OR CONSTRUCTION MANAGER 31
ARTICLE 10 - JURISDICTIONAL DISPUTES 31
SECTION 1. NO DISRUPTIONS 31
SECTION 2. ASSIGNMENT 31
SECTION 3. NO INTERFERENCE WITH WORK 31
ARTICLE 11 - WAGES AND BENEFITS 32
SECTION 1. CLASSIFICATION AND BASE HOURLY RATE 32
SECTION 2. EMPLOYEE BENEFITS 32
ARTICLE 12 - HOURS OF WORK, PREMIUM PAYMENTS, SHIFTS AND HOLIDAYS 37
SECTION 1. WORK WEEK AND WORKDAY 37
SECTION 2. OVERTIME 38
SECTION 3. SHIFTS 39
SECTION 4. HOLIDAYS 40
SECTION 5. MAKE-UP DAYS 41
SECTION 6. REPORTING PAY 41

SECTION 7. PAYMENT OF WAGES 42
SECTION 8. EMERGENCY WORK SUSPENSION 42
SECTION 9. INJURY/DISABILITY 43
SECTION 10. TIME KEEPING 43
SECTION 11. MEAL PERIOD 43
SECTION 12. BREAK PERIODS 43
ARTICLE 13 - APPRENTICES AND WORKFORCE DEVELOPMENT 44
SECTION 1. APPRENTICE RATIOS AND REFERRALS 44
SECTION 2. WORKFORCE DEVELOPMENT 44
ARTICLE 14 - SAFETY PROTECTION OF PERSON AND PROPERTY 47
SECTION 1. SAFETY REQUIREMENTS 47
SECTION 2. CONTRACTOR RULES 47
SECTION 3. INSPECTIONS 47
ARTICLE 15 - TEMPORARY SERVICES 48
SECTION 1 48
ARTICLE 16 - NO DISCRIMINATION 48
SECTION 1. COOPERATIVE EFFORTS 48
SECTION 2. LANGUAGE OF AGREEMENT 48
ARTICLE 17 - GENERAL TERMS 49
SECTION 1. PROJECT RULES 49
SECTION 2. TOOLS OF THE TRADE 49
SECTION 3. SUPERVISION 49
SECTION 4. TRAVEL ALLOWANCES 49
SECTION 5. FULL WORKDAY 50
SECTION 6. COOPERATION AND WAIVER 50
ARTICLE 18 - SAVINGS AND SEPARABILITY 50
SECTION 1. THIS AGREEMENT 50
SECTION 2. THE BID SPECIFICATIONS 51
SECTION 3. NON-LIABILITY 51
SECTION 4. NON-WAIVER 52
ARTICLE 19 - FUTURE CHANGES IN SCHEDULE “A” AREA CONTRACTS 52
SECTION 1. CHANGES TO AREA CONTRACTS 52

SECTION 2. LABOR DISPUTES DURING AREA CONTRACT NEGOTIATIONS 53
ARTICLE 20 - WORKERS' COMPENSATION ADR 53
SECTION 1 53
ARTICLE 21 - HELMETS TO HARDHATS 53
SECTION 1 53
SECTION 2 54
SIGNATURE PAGES FOR THE LOCAL UNIONS: 56
SCHEDULE "A" - CBAs 90
Exhibit A 95
Exhibit B 97
Exhibit "C" – Community Hiring Construction Careers 98
EXHIBIT "D" – Centrifuge Division of Labor Document 99
SCHEDULE "B" - DRUG AND ALCOHOL POLICY 106

PROJECT LABOR AGREEMENT COVERING SPECIFIED NEW CONSTRUCTION, RENOVATION & REHABILITATION OF NEW YORK CITY OWNED BUILDINGS & STRUCTURES

ARTICLE 1 - PREAMBLE

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

NOW, THEREFORE, the Parties enter into this Agreement:

SECTION 1. PARTIES TO THE AGREEMENT

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

ARTICLE 2 - GENERAL CONDITIONS

SECTION 1. DEFINITIONS

A. The term "Agency" means each of the following New York City agencies, individually or collectively as applicable: the Department for the Aging ("DFTA"), Administration

for Children's Services ("ACS"), Department of Citywide Administrative Services ("DCAS"), Department of Correction ("DOC"), Department of Design and Construction ("DDC"), Fire Department ("FDNY"), Department of Homeless Services ("DHS"), Human Resources Administration ("HRA"), Department of Health and Mental Hygiene ("DOHMH"), Department of Parks and Recreation ("DPR"), Police Department ("NYPD"), Department of Sanitation ("DSNY"); Department of Transportation ("DOT"), Department of Buildings ("DOB"), and Department of Environmental Protection ("DEP"); with respect to Program Work as defined in Article 3, the New York City agency that awards a particular contract subject to this Agreement may be referred to hereafter as the "Agency";

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

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

D. The term "City" refers to the City of New York;

E. The term "Community Hiring Construction Careers" refers to the PLA initiative to advance career opportunities for Residence-Based Community Hires;

F. The term "Contractor(s)" shall include any Construction Manager, General Contractor and all other contractors, and subcontractors of all tiers engaged in Program Work within the scope of this Agreement as defined in Article 3;

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

H. The term "DBEs" means Disadvantaged Business Enterprises as defined in 49 C.F.R. Part 26;

I. The term "Economically Disadvantaged Region" means an area, represented by its five-digit ZIP code, in which at least fifteen percent of residents have household incomes below the federal poverty threshold;

J. The term "Minor Repair" means routine repair, service, or maintenance that is recurrent, day to day, periodic scheduled or routine work required to preserve or restore a building, facility or system to working order. Such work shall qualify as "Minor Repair" if; i) a wage and benefit rate applicable to the work is listed on the New York City Comptroller's ("NYC Comptroller") prevailing wage schedule as repair work and is lower than the Schedule A rate; and ii) the work satisfies the definition and criteria established by the NYC Comptroller for application of that lower rate for the work being performed.

K. The term "MWBEs" means Minority and Women Owned Business Enterprises as the entities are defined in NYC Charter 1304;

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

M. The term "Residence-Based Community Hire" means an individual who is: (1) a resident of an address within an Economically Disadvantaged Region; (2) a resident of a building that is: (i) owned or operated by the New York City Housing Authority; and (ii) subject to section nine of the United States Housing Act of nineteen hundred thirty-seven, as amended; or (3) a resident of a dwelling unit that is: (i) subject to a regulatory agreement with a federal, state or local government agency requiring that occupancy of such unit be restricted based on the income of the

occupants; and (ii) located in a building that was previously operated by the New York City Housing Authority, was previously subject to section nine of the United States Housing Act of nineteen hundred thirty-seven, as amended, and is subject to section eight of such act; and

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

SECTION 2. CONDITIONS FOR AGREEMENT TO BECOME EFFECTIVE

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

SECTION 3. ENTITIES BOUND & ADMINISTRATION OF AGREEMENT

This Agreement shall be binding on all participating Unions and their affiliates, the Construction Manager (in its capacity as such) and all Contractors of all tiers performing Program Work, as defined in Article 3. The Contractors shall include in any subcontract that they let for performance during the term of this Agreement a requirement that their subcontractors, of all tiers, become signatory and bound by this Agreement with respect to that subcontracted work falling within the scope of Article 3 and all Contractors (including subcontractors) performing Program Work shall be required to sign a "Letter of Assent" in the form annexed hereto as Exhibit "A". This Agreement shall be administered by the applicable Agency or a Construction Manager or such other designee as may be named by the Agency or Construction Manager, on behalf of all Contractors. When the Agency manages Program Work without a Construction Manager, unless otherwise provided, it has the rights and obligations of a Construction Manager in addition to the rights and obligations of an Agency, if applicable. The City shall provide BCTC with the contact

information of the Agency Chief Contracting Officer for each Agency and BCTC shall provide the City with the contact information of a representative for each Local Union.

SECTION 4. SUPREMACY CLAUSE

This Agreement, together with the local Collective Bargaining Agreements (each a "CBA") appended hereto as Schedule "A", represents the complete understanding of all signatories and supersedes any national agreement, local agreement or other CBA of any type which would otherwise apply to this Program Work, in whole or in part, except: 1) to the extent applicable, work performed that may fall under the NTL Articles of Agreement, the National Stack/Chimney Agreement, the National Cooling Tower Agreement, all instrument calibration work and loop checking which shall be performed under the UA/IBEW Joint National Agreement for Instrument and Control Systems Technicians, and the National Agreement of the International Union of Elevator Constructors, with the exception of Article 2, Section 7, and Articles 7, 9 and 10 of this Agreement, which shall apply to such work; and 2) Program Work which falls within the jurisdiction of the Operating Engineers Locals 14 and 15. If Program Work falling within the jurisdiction of Operating Engineers Locals 14 and 15 is accepted by and performed by said locals, only then will such work be performed under the terms and conditions set out in the Schedule "A" agreements of Operating Engineers Locals 14 and 15. The CBAs of the affiliated local unions that cover the particular type of construction work to be performed by the contractor, and as set forth in the Schedule "A" list of agreements, shall be deemed the Schedule "A" Collective Bargaining Agreements ("Schedule 'A' CBA") under this Agreement. Where association and independent CBAs for a particular type of construction work are both set forth in Schedule "A", association members shall treat the applicable association agreement as the Schedule "A" CBA and independent contractors shall treat the applicable independent agreement as the Schedule "A"

CBA. Subject to the foregoing, where a subject covered by the provisions of this project labor agreement is also covered by a Schedule "A" CBA, the provisions of this project labor agreement shall prevail. It is further understood that no Contractor shall be required to sign any other agreement as a condition of performing Program Work. No practice, understanding or agreement between a Contractor and a Local Union which is not set forth in this Agreement shall be binding with respect to Program Work unless endorsed in writing by the Construction Manager or such other designee as may be designated by the Agency. Nothing in this Agreement requires employees to join a union or pay dues or fees to a union as a condition of working on the Program Work. This Agreement is not, however, intended to supersede independent requirements in applicable local union agreements as to contractors that are otherwise signatory to those agreements and as to employees of such employers performing Program Work.

SECTION 5. LIABILITY

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

SECTION 6. THE AGENCY

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

awarded contracts for Program Work. It is further understood that the Agency or Construction Manager has sole discretion at any time to terminate, delay or suspend the Program Work, in whole or part, on any project.

SECTION 7. AVAILABILITY AND APPLICABILITY TO ALL SUCCESSFUL BIDDERS

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

SECTION 8. SUBCONTRACTING

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

ARTICLE 3 - SCOPE OF THE AGREEMENT

SECTION 1. WORK COVERED

A. Program Work shall be limited to designated new construction, rehabilitation and renovation construction contracts bid and let by an Agency (or its Construction Manager where applicable) after the effective date of this Agreement with respect to new construction, rehabilitation and renovation work performed for an Agency on City-owned property under contracts advertised for public solicitation prior to December 31, 2028. Subject to the foregoing, and the exclusions below, such Program Work shall mean:

1. For Renovation and Rehabilitation Projects: any and all contracts that predominantly involve the demolition, reconstruction, renovation, alteration, repair, rehabilitation or expansion of an existing City-owned building, pier, marina, or structure within the five boroughs of the City. Examples of Program Work include, but are not limited to, the renovation, repair, alteration and rehabilitation of an existing temporary or permanent structure, or an expansion of above ground structures located in the City on a City-owned building, Wastewater Resource Recovery Facility, a water filtration plant, or a pumping station. Program Work shall also include job order contracts ("JOCS"), demolition work, painting services. Low voltage work, site work, elevator work, mold, asbestos and lead abatement, carpentry services, and carpet removal and installation shall be included as Program Work only when incidental to such building renovation and/or rehabilitation of City-owned buildings or structures and included in a contract that predominantly involves such renovation and/or rehabilitation. Program Work shall also include the installing and removing of centrifuges on City-owned property, but not any other work under such contracts, in connection with contracts that involve the maintenance or repair of centrifuges, in accordance with Exhibit "D". Program Work shall also include contracts bid and let by the DEP for the rehabilitation and upgrade of wells and well stations located in Southeast Queens as part of the Queens Groundwater Project, including the renovation and rehabilitation of buildings and other above or below-ground structures, the installation of equipment, piping and drainage structures including subsurface installations, the installation of water treatment system elements, control systems, plumbing, electrical, HVAC and site and road work required for the construction, operation or maintenance of the wells and other related facilities.

2. For New Construction Projects: new construction, including a construction of an entirely new park exceeding $10,000,000 if the Project also involves construction of a new above-

ground building such as a restroom, field house, garage or maintenance facility, for which an addendum has been approved by an agency of the City of New York and by the BCTC on behalf of itself and its affiliated Local Unions. Each Project-specific addendum is to outline a description of the project being undertaken, the project's location, and the general findings of the feasibility analysis used as the basis of the determination to utilize a PLA on the project.

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

1. Contracts that are let under a different project labor agreement with an Agency, and/or other entities that have entered separate PLAs, such as NYCHA, H+H and SCA;

2. Contracts let and work performed in connection with projects carried over, recycled from, or performed under bids or rebids relating to work that were bid prior to the effective date of this Agreement or after December 31, 2028;

3. Contracts procured on an emergency basis;

4. Prime contracts that do not exceed $3,000,000;

5. Contracts for work on streets and bridges and for the closing or environmental remediation of landfills;

6. Contracts with not-for-profit corporations where the City is not awarding or performing the work performed for that entity;

7. Contracts with governmental entities where the City is not awarding or performing the work performed for that entity;

8. Contracts with electric utilities, gas utilities, telephone companies, and railroads, except that it is understood and agreed that these entities may only install their work to

a demarcation point, *e.g.*, a telephone closet or utility vault, the location of which is determined prior to construction and employees of such entities shall not be used to replace employees performing Program Work pursuant to this Agreement;

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

10. Task Orders or Work Orders issued under JOCS or Requirements Contracts that do not exceed $250,000, and JOCS or Requirements Contracts where the monetary value of such contracts predominantly involves such Task Orders or Work Orders;

11. Contracts that predominantly involve Minor Repair work, as defined in Article 2, Section 1(J) above. Such work is to be paid under the applicable prevailing wage law, if any, for service or maintenance work;

12. Up to 7% of work set aside to be performed by certified MWBE or DBE subcontractors ("Exempt Work") on prime contracts that are valued at $25,000,000 or more where participation goals are set forth in the contract to be performed by MWBEs or DBEs; and provided that: (i) the prime contractor shall first work in good faith with the relevant Local Unions, to identify one or more MWBE or DBE subcontractors who are a signatory to a Schedule "A" CBA or who will sign a Letter of Assent (Exhibit "A") as required under Article 2, Section 3 above to meet the 7% prior to such work being set aside; and (ii) if the prime contractor nevertheless fails to identify one or more MWBE or DBE subcontractors who are a signatory to a Schedule "A" CBA or who will sign a Letter of Assent (Exhibit "A") as required under Article 2, Section 3 above, then the amount of Exempt Work allowed to be set aside pursuant to this paragraph on a given project shall only be the difference between 7% of the prime contract value and the percentage of work awarded pursuant to this paragraph. Performance of a portion of the Exempt

Work performed by the certified MWBE or DBE subcontractors does not preclude the contractor from employing one or more MWBE or DBE subcontractor who is a signatory on another portion of the Exempt Work. Such Exempt Work shall be no more than $500,000 or 20% (whichever is greater) of the value of the subcontracts for work in any particular union's jurisdiction under any prime contract; and

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

SECTION 2. TIME LIMITATIONS

In addition to falling within the scope of Article 3, Section 1, to be covered by this Agreement, Program Work must be (1) advertised and let for bid after the effective date of this Agreement, and (2) let for bid prior to December 31, 2028, the expiration date of this Agreement. It is understood that this Agreement, together with all of its provisions, shall remain in effect for all such Program Work until completion, even if not completed by the expiration date of the Agreement. If Program Work otherwise falling within the scope of Article 3, Section 1 is not let for bid by the expiration date of this Agreement, this Agreement may be extended to that work by mutual agreement of the parties.

SECTION 3. EXCLUDED EMPLOYEES

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

A. Superintendents, supervisors (except field surveyors on construction contracts, general and forepersons specifically covered by a craft's Schedule "A" CBA are included), engineers, professional engineers and/or licensed architects engaged in inspection and testing,

quality control/assurance personnel, timekeepers, mail carriers, clerks, office workers, messengers, guards, technicians, non-manual employees, and all professional, engineering, administrative and management persons;

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

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

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

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

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

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

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

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

I. Employees who perform work classified as Minor Repairs, provided that such workers are paid at the applicable prevailing wage, if any, for the work being performed.

SECTION 4. NON-APPLICATION TO CERTAIN ENTITIES

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

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

ARTICLE 4 - UNION RECOGNITION AND EMPLOYMENT

SECTION 1. PRE-HIRE RECOGNITION

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

SECTION 2. UNION REFERRAL

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

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

1. possess any license required by New York State law for the Program Work to be performed;
2. have worked a total of at least 1000 hours in the Construction field during the prior 3 years; and

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

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

C. Notwithstanding Section 2(B), above, certified MWBE contractors for which participation goals are set forth in New York City Administrative Code §6-129, or DBE contractors for which participation goals are established, that are not signatory to any Schedule "A" CBAs, with subcontracts valued at or under two-million dollars ($2,000,000), and where the first two or more workers are hired simultaneously, may request by name, and the Local Union will honor, referral of the first (1st), fourth (4th), sixth (6th), and eighth (8th) Core Employee. In any case where the first two or more employees are not hired simultaneously, the certified MWBE's or DBE's Core Employees may be the second (2nd), fourth (4th), sixth (6th), and eighth (8th) Core Employee. All such Core Employees must have applied to the Local Union for Program Work and meet the following qualifications:

1. possess any license required by New York State law for the Program Work to be performed;
2. have worked a total of at least 1000 hours in the Construction field during the prior 3 years; and
3. were on the Contractor's active payroll for at least 60 out of the 365 calendar days prior to the contract award.

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

SECTION 3. NON-DISCRIMINATION IN REFERRALS

The Council represents that each Local Union hiring hall and referral system will be operated in a non-discriminatory manner and in full compliance with all applicable federal, state and local laws and regulations which require equal employment opportunities. Referrals shall not be affected in any way by the rules, regulations, bylaws, constitutional provisions or any other aspects or obligations of union membership, policies or requirements and shall be subject to such other conditions as are established in this Article. No employment applicant shall be discriminated against by any referral system or hiring hall because of the applicant's union membership, or lack thereof.

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

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

The Local Unions agree to prioritize the referral of Residence-Based Community Hires in accordance with Article 13 and to the extent consistent with the law, rules applicable to the union referral systems and joint apprentice programs. Those unions that do not currently provide for Residence-Based Community Hire preferences in their referral systems will undertake to implement such preferences consistent with this Agreement and their governing documents. Please see Exhibit "C" for a non-exhaustive list of the Economically Disadvantaged Regions. Residence-Based Community Hires who are already on a Contractor's workforce, including Core

Employees, and referral of apprentices, in accordance with Article 13, Section 1(A) below, shall count towards the referral goals of this Section.

For any Program Work that may become subject to requirements under Section 3 of the Housing and Urban Development Act of 1968, as amended by the Housing and Community Development Act of 1992, and any rules, including new or revised rules, that may be published thereunder, the Local Unions acknowledge the Section 3 obligations of the Construction Manager or Contractor, as applicable, and agree to the preferences for Residence-Based Community Hires described above to help implement this Article in a manner that would allow the Construction Manager or Contractor to meet its Section 3 obligations to the greatest extent feasible, and to post any required notices in the manner required by Section 3. The parties also acknowledge that the Construction Manager and Contractor(s) may also fulfill its Section 3 requirements on Program Work by promoting opportunities for excluded employees, as defined by Article 3, Section 3 of this Agreement, on Program Work and, to the extent permitted by Section 3, by promoting opportunities for craft and other employees on non-Program Work.

SECTION 5. CROSS AND QUALIFIED REFERRALS

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

SECTION 6. CRAFT FOREPERSONS AND GENERAL FOREPERSONS

The selection of craft forepersons and/or general forepersons and the number of forepersons required shall be solely the responsibility of the Contractor except where otherwise provided by specific provisions of an applicable Schedule “A” CBA, and provided that all craft

forepersons shall be experienced and qualified journeypersons in their trade as determined by the appropriate Local Union. All forepersons shall take orders exclusively from the designated Contractor representatives. Craft forepersons shall be designated as working forepersons at the request of the Contractor, except when an existing local CBA prohibits a foreperson from working when the craft persons, they are leading exceed a specified number.

SECTION 7. ON CALL REPAIR REFERRALS

A. When an Agency awards a contract under this Agreement that requires the Contractor to have employees available on short notice to make time-sensitive repairs with such contract requiring the Contractor to respond within as little as two hours from the time the Contractor is contacted by the Agency ("On Call, Repair Contract"), the Contractor will, within ten (10) days of being awarded an On Call, Repair Contract subject to this Agreement, notify the appropriate affiliated Union that would perform the work for a contractor that the Contractor has been awarded such a contract and immediately enter into good faith negotiations with such relevant affiliated Union to establish a procedure to receive time sensitive referrals from such affiliated Union(s).

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

1. Upon notification by a Contractor that it has been awarded an On Call, Repair Contract pursuant to paragraph A above, each relevant affiliate Union shall provide the

Contractor with the name and twenty-four (24) hour contact information of an On Call, Repair Contract contact person for urgent on call repair referrals.

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

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

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

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

ARTICLE 5 - UNION REPRESENTATION

SECTION 1. LOCAL UNION REPRESENTATIVE

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

SECTION 2. STEWARDS

A. Each affiliated Union shall have the sole discretion to designate any journey person as a Steward and an alternate Steward. The Union shall notify the Owner and/or Construction Manager as well as the Contractor of the identity of the designated Steward (and alternate) prior to the assumption of such duties. Stewards shall not exercise supervisory functions and will receive the regular rate of pay for their craft classifications. All Stewards shall be working Stewards.

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

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

SECTION 3. LAYOFF OF A STEWARD

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

ARTICLE 6 - MANAGEMENT'S RIGHTS

SECTION 1. RESERVATION OF RIGHTS

Except as expressly limited by a specific provision of this Agreement, Contractors retain full and exclusive authority for the management of their operations including, but not limited to, the right to: direct the workforce, including determination as to the number of employees to be hired and the qualifications therefore; the promotion, transfer, layoff of its employees; require compliance with the directives of the Agency including standard restrictions related to security and access to the site that are equally applicable to Agency employees, guests, or vendors; or the discipline or discharge for just cause of its employees; assign and schedule work; promulgate reasonable Program Work rules that are not inconsistent with this Agreement or rules common in the industry and are reasonably related to the nature of work; and, the requirement, timing and number of employees to be utilized for overtime work. No rules, customs, or practices which limit or restrict productivity or efficiency of the individual, as determined by the Contractor, Agency and/or Construction Manager and/or joint working efforts with other employees shall be permitted or observed.

SECTION 2. MATERIALS, METHODS & EQUIPMENT

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

ARTICLE 7 - WORK STOPPAGES AND LOCKOUTS

SECTION 1. NO STRIKES-NO LOCK OUT

There shall be no strikes, sympathy strikes, picketing, work stoppages, slowdowns, hand billing, demonstrations or other similar disruptive activity at the Program Work site for any reason by any Union or employee against any Contractor or employer. There shall be no other Union or

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

SECTION 2. DISCHARGE FOR VIOLATION

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

SECTION 3. NOTIFICATION

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

SECTION 4. EXPEDITED ARBITRATION

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

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

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

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

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

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

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

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

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

SECTION 5. ARBITRATION OF DISCHARGES FOR VIOLATION

Procedures contained in Article 9 shall not be applicable to any alleged violation of this Article, with the single exception that an employee discharged for violation of Section 1, above, may have recourse to the procedures of Article 9 to determine only if the employee did, in fact,

violate the provisions of Section 1 of this Article; but not for the purpose of modifying the discipline imposed where a violation is found to have occurred.

ARTICLE 8 - LABOR MANAGEMENT COMMITTEE

SECTION 1. SUBJECTS

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

SECTION 2. COMPOSITION

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

ARTICLE 9 - GRIEVANCE & ARBITRATION PROCEDURE

SECTION 1. PROCEDURE FOR RESOLUTION OF GRIEVANCES

Any question, dispute or claim arising out of, or involving the interpretation or application of this Agreement (other than jurisdictional disputes or alleged violations of Article 7, Section 1) shall be considered a grievance and shall be resolved pursuant to the exclusive procedure of the steps described below, provided, in all cases, that the question, dispute or claim arose during the term of this Agreement. Grievances shall include the City contract number and the Program Work

address; such information is posted at the work site if already commenced and is available in the City Record and Notice to Proceed for projects not already commenced.

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

Step 1:

(a) When any employee covered by this Agreement feels aggrieved by a claimed violation of this Agreement, the employee shall, through the Local Union business representative or job steward give notice of the claimed violation to the work site representative of the involved Contractor and the Construction Manager. To be timely, such notice of the grievance must be given within 7 calendar days after the act, occurrence or event giving rise to the grievance. The business representative of the Local Union or the job steward and the work site representative of the involved Contractor shall meet and endeavor to adjust the matter within 7 calendar days after timely notice has been given. If they fail to resolve the matter within the prescribed period, the grieving party, may, within 7 calendar days thereafter, pursue Step 2 of the grievance procedure

by serving the involved Contractor with written copies of the grievance setting forth a description of the claimed violation, the date on which the grievance occurred, and the provisions of the Agreement alleged to have been violated. Grievances and disputes settled at Step 1 are non-precedential except as to the specific Local Union, employee and Contractor directly involved unless the settlement is accepted in writing by the Agency (or designee) as creating a precedent.

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

Step 2:

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

Step 3:

(a) If the grievance shall have been submitted but not resolved in Step 2, any of the participating Step 2 entities may, within 21 calendar days after the initial Step 2 meeting, submit the grievance in writing (copies to other participants, including the Construction Manager or

designee and the Agency or designee) to the BCTC. In the event the matter is not resolved at Step 2, either J.J. Pierson or Gayle Gavin, who shall act, alternately (beginning with Arbitrator J.J. Pierson), as the Arbitrator under this procedure, shall be designated at the Step 2 hearing and the BCTC will notify the arbitrator of his designation. After such notification by the BCTC, the local demanding arbitration shall within a reasonable time request the arbitrator to schedule the matter for an arbitration hearing date. The Labor Arbitration Rules of the American Arbitration Association shall govern the conduct of the arbitration hearing, at which all Step 2 participants shall be parties. The decision of the Arbitrator shall be final and binding on the involved Contractor, Local Union and employees and the fees and expenses of such arbitrations shall be borne equally by the involved Contractor and Local Union.

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

SECTION 2. LIMITATION AS TO RETROACTIVITY

No arbitration decision or award, with the exception of those related to compliance with requirements to pay prevailing wages and supplements in accordance with federal or State law, may provide retroactivity of any kind exceeding 60 calendar days prior to the date of service of the written grievance on the Construction Manager and the involved Contractor or Local Union.

SECTION 3. PARTICIPATION BY AGENCY AND/OR CONSTRUCTION MANAGER

The Agency and Construction Manager (or such other designee of the Agency) shall be notified by the involved Contractor of all actions at Steps 2 and 3 and, at its election, may participate in full in all proceedings at these Steps, including Step 3 arbitration.

ARTICLE 10 - JURISDICTIONAL DISPUTES

SECTION 1. NO DISRUPTIONS

There will be no strikes, sympathy strikes, work stoppages, slowdowns, picketing or other disruptive activity of any kind arising out of any jurisdictional dispute. Pending the resolution of the dispute, the work shall continue uninterrupted and as assigned by the Contractor. No jurisdictional dispute shall excuse a violation of Article 7.

SECTION 2. ASSIGNMENT

All Program Work assignments shall be made by the Contractor to unions affiliated with the BCTC consistent with the New York Plan for the Settlement of Jurisdictional Disputes ("New York Plan") and its Greenbook decisions, if any. Where there are no applicable Greenbook decisions, assignments shall be made in accordance with the provisions of the New York Plan and local industry practice.

SECTION 3. NO INTERFERENCE WITH WORK

There shall be no interference or interruption of any kind with the Program Work while any jurisdictional dispute is being resolved. The work shall proceed as assigned by the Contractor until finally resolved under the applicable procedure of this Article. The award shall be confirmed in writing to the involved parties. There shall be no strike, work stoppage or interruption in protest of any such award.

ARTICLE 11 - WAGES AND BENEFITS

SECTION 1. CLASSIFICATION AND BASE HOURLY RATE

All employees covered by this Agreement shall be classified in accordance with the work performed and paid the hourly wage rates applicable for those classifications as required by the applicable prevailing wage laws.

SECTION 2. EMPLOYEE BENEFITS

A. The Contractors agree to pay on a timely basis contributions on behalf of all employees covered by this Agreement to those established jointly trusteed employee benefit funds designated in the applicable Schedule "A" CBA (in the appropriate Schedule "A" amounts), provided that such benefits are required to be paid on public works under any applicable prevailing wage law. Bona fide jointly trusteed fringe benefit plans established or negotiated through collective bargaining during the life of this Agreement may be added if similarly required under applicable prevailing wage law. Contractors, not otherwise contractually bound to do so, shall not be required to contribute to benefits, trusts or plans of any kind which are not required by the prevailing wage law provided, however, that this provision does not relieve Contractor's signatory to local collective bargaining agreement with any affiliated union from complying with the fringe benefit requirements for all funds contained in the CBA. Furthermore, employees that may remain unaffiliated with any local union at the completion of their employment under the terms of this Agreement may apply for any distributions to which they may be entitled from the funds in accordance with the applicable rules and governing documents of the unions and the employee benefit funds that they have participated in under the terms of this Agreement.

B. 1. Notwithstanding Section 2 (A) above, and subject to 2 (B)(2) below, Contractors who designate Core Employees pursuant to Article 4, Section 2 (B) and (C) that are not signatory to a Schedule "A" CBA and who maintain bona fide private benefit plans that satisfy

the requirements of Section 220 of the New York State Labor Law, may satisfy the above benefit obligation with respect to those employees by providing those employees with coverage under their private benefit plans (to the extent consistent with Section 220). The total benefit payments to be made on behalf of each such employee must be equal to the total Section 220 supplement amount and any shortfall must be paid by cash supplement to the employee.

2. A contractor that will satisfy its Section 220 obligations in accordance with subsection 2(B)(1) above shall make available to the Agency at the time of contract award a complete set of plan documents for each non-Schedule "A" benefit plan into which contributions will be made and/or coverage provided pursuant to the provisions of Section 2(B)(l) above. The Contractor shall also provide certification from a certified public accountant as to the annualized hourly value of such benefits consistent with the requirements of Section 220.

3. The City shall verify that the alternate benefit plan(s), together with any cash supplement to the employee, is compliant with Section 220 prior to awarding the Contractor a contract covered by this Agreement. In the event the Contractor's alternate benefit plan(s), together with any cash supplement to the employee, is determined to be compliant with Section 220 and will be utilized by the Contractor on behalf of Article 4, Section 2(B) and (C) Core Employees, the Local Unions have no duty to enforce the Contractor's obligations on the alternate benefit plan(s) as they are not party to the alternate plan(s) or privy to the terms and conditions of the plan obligations. In the event the City determines the alternate benefit plan(s), together with any cash supplement to the employee, is not compliant with Section 220, the Contractor may, upon executing a Letter of Assent, satisfy its obligations for all employees, including Core Employees, by contributing to the Schedule "A" benefit plans in accordance with the terms of the Schedule "A" CBAs.

C. The Contractors agree to be bound by the written terms of the legally established jointly trusteed Trust Agreements specifying the detailed basis on which payments are to be paid into, and benefits paid out of, such Trust Funds but only with regard to Program Work done under this Agreement and only for those employees to whom this Agreement requires such benefit payments.

D. 1. To the extent consistent with New York City's Procurement Policy Board Rules with respect to prompt payment, as published at www.nyc.gov/ppb, §4-06(e), and in consideration of the unions' waiver of their rights to withhold labor from a contractor or subcontractor delinquent in the payment of fringe benefits contributions ("Delinquent Contractor"); the Agency agrees that where any such union and/or fringe benefit fund shall notify the Agency, the General Contractor, and the Delinquent Contractor in writing with back-up documentation that the Delinquent Contractor has failed to make fringe benefit contributions to it as provided herein and the Delinquent Contractor shall fail, within ten (10) calendar days after receipt of such notice, to furnish either proof of such payment or notice that the amount claimed by the union and/or fringe benefit fund is in dispute, the Agency shall withhold from amounts then or thereafter becoming due and payable to the General Contractor an amount equal to that portion of such payment due to the General Contractor that relates solely to the work performed by the Delinquent Contractor which the union or fringe benefit fund claims to be due it, and shall remit the amount when and so withheld to the fringe benefit fund and deduct such payment from the amounts then otherwise due and payable to the General Contractor, which payment shall, as between the General Contractor and the Agency, be deemed a payment by the Agency to the General Contractor; provided however, that in any month, such withholding shall not exceed the amount contained in the General Contractor's monthly invoice for work performed by the Delinquent Contractor. The union or its

employee benefit funds shall include in its notification of delinquent payment of fringe benefits only such amount it asserts the Delinquent Contractor failed to pay on the specific project against which the claim is made and the union or its employee benefit funds may not include in such notification any amount such Delinquent Contractor may have failed to pay on any other City or non-City project.

2. In addition, where a union or employee benefit fund gives notice to the City that a Contractor is Delinquent as defined in subsection 2(D)(1) above and the City determines that the notice includes appropriate back-up documentation that the Contractor is delinquent, the City will promptly, but not later than twenty (20) days after receipt of the notice, provide a copy of said notice to City Agencies. In the event the City determines there is insufficient back-up documentation, it will notify the appropriate union and/or fringe benefit fund promptly, but not later than twenty (20) days after receipt of the Delinquency Notice, and shall include notice of what additional documentation is requested. Any determination by the City that there is insufficient back-up must be reasonable. This provision is intended to enhance compliance with the prevailing wage law and this Agreement with respect to the payment of fringe benefits and is not intended as a substitute for the resolution of a disputed claim pursuant to any applicable law or agreement.

The City and the relevant Agency(s) will thereafter require the Delinquent Contractor to provide cancelled checks or other equivalent proof of payment of benefit contributions that have come due, to be submitted with certified payroll reports for all Program Work covered by this Agreement on which the Delinquent Contractor is engaged, for at least a one-year period or such earlier period if the Contractor is ultimately determined not to be a Delinquent Contractor. Such proof of payment when required is a condition of payment of the Delinquent Contractor's invoices

by any entity, including, but not limited to, the City, the relevant Agency(s), Construction Manager, General Contractor, the prime or higher level subcontractor, as is appropriate under the Delinquent Contractor's engagement. The union and the funds shall upon request receive copies of the certified payrolls, cancelled checks, or other proof of payment from the City and/or the relevant Agency(s).

E. In the event the General Contractor or Delinquent Contractor shall notify the Agency as above provided that the claim of the union or fringe benefit fund is in dispute, the Agency shall withhold from amounts then or thereafter becoming due and payable to the General Contractor an amount equal to that portion of such payment due to the General Contractor that relates solely to the work performed by the Delinquent Contractor that the union and/or fringe benefit fund claims to be due it, pending resolution of the dispute pursuant to the union's Schedule "A" CBA, and the amount shall be paid to the party or parties ultimately determined to be entitled thereto, or held until the Delinquent Contractor and union or employee benefit fund shall otherwise agree as to the disposition thereof; provided however, that such withholding shall not exceed the amount contained in the General Contractor's monthly invoice for work performed by the Delinquent Contractor. In the event the Agency shall be required to withhold amounts from a General Contractor for the benefit of more than one fringe benefit fund, the amounts so withheld in the manner and amount prescribed above shall be applied to or for such fund in the order in which the written notices of nonpayment have been received by the Agency, and if more than one such notice was received on the same day, proportionately based upon the amount of the union and/or fringe benefit fund claims received on such day. Nothing herein contained shall prevent the Agency from commencing an interpleader action to determine entitlement to a disputed

payment in accordance with section one thousand six of the civil practice law and rules or any successor provision thereto.

F. Payment to a fringe benefit fund under this provision shall not relieve the General Contractor or Delinquent Contractor from responsibility for the work covered by the payment. Except as otherwise provided, nothing contained herein shall create any obligation on the part of the Agency to pay any union or fringe benefit fund, nor shall anything provided herein serve to create any relationship in contract or otherwise, implied or expressed, between the union/fund and/or fringe benefit and the Agency.

ARTICLE 12 - HOURS OF WORK, PREMIUM PAYMENTS, SHIFTS AND HOLIDAYS

SECTION 1. WORK WEEK AND WORKDAY

A. The standard work week shall consist of 40 hours of work at straight time rates, Monday through Friday, 8 hours per day, plus ½ hour unpaid lunch period. For renovation and rehabilitation projects only, the standard work week may be reduced to 35 or 37 ½ hours of work at straight time rates, Monday to Friday, 7 or 7 ½ hours per day, plus ½ hour unpaid lunch period in those limited circumstances where the City states in the bid documents that the Contractor will not be given access to the site to accommodate an 8 hour day. The 8 hour, 7 ½ hour or 7-hour workday must be established at the commencement of the renovation and rehabilitation project and may not be altered by the Contractor.

B. In accordance with project needs, there shall be flexible start times with advance notice from Contractor to the Union. The Day Shift shall commence between the hours of 6:00 a.m. and 9:00 a.m. and shall end between the hours of 2:30 p.m. and 5:30 p.m., for an 8-hour day, and up to 7:30 p.m. for a 10-hour day. The Evening Shift shall commence between the hours of 3:00 p.m. and 6:00 p.m., unless different times are necessitated by the Agency's phasing plans on specific projects. The Night Shift shall commence between the hours of 11:00 p.m. and 2:00 a.m.,

unless different times are necessitated by the Agency's phasing plans on specific projects. Subject to the foregoing, starting and quitting times shall occur at the Program Work site designated by the Contractor.

C. Scheduling - Except as provided above, Monday through Friday is the standard work week; 8 hours of work plus ½ hour unpaid lunch. Notwithstanding any other provision of this Agreement, a Contractor may, for renovation and rehabilitation projects only, schedule a four-day work week, 10 hours per day ("4/10") at straight time rates, plus a ½ hour unpaid lunch, at the commencement of the job.

D. Notice - Contractors shall provide not less than 5 days prior notice to the Local Union involved as to the work week and work hour schedules to be worked or such lesser notice as may be mutually agreed upon.

SECTION 2. OVERTIME

Overtime shall be paid for any work exceeding either (i) an employee's regularly scheduled work day, i.e., work over eight (8) hours in a day where 5/8s is scheduled, work over ten (10) hours in a day where 4/10s is scheduled, or work over seven (7) or seven and one half (7½) hours where such hours are scheduled pursuant to Article 12, section 1(A); or (ii) an employee's regularly scheduled work week, i.e., over forty (40) hours in a week, or over thirty five (35) or thirty seven and one-half (37 ½) where such hours are scheduled pursuant to Article 12, Section 1(A). Overtime shall be paid at time and one half (1½) Monday through Saturday. All overtime work performed on Sunday and Holidays will be paid pursuant to the applicable Schedule "A" CBA. There shall be no stacking or pyramiding of overtime pay under any circumstances. There will be no restriction upon the Contractor's scheduling of overtime or the nondiscriminatory designation of employees who shall be worked, including the use of employees, other than those who have

worked the regular or scheduled work week, at straight time rates. The Contractor shall have the right to schedule work so as to minimize overtime or schedule overtime as to some, but not all, of the crafts and whether or not of a continuous nature.

SECTION 3. SHIFTS

A. Flexible Schedules - Scheduling of shift work, including Saturday and Sunday work, shall be within the discretion of the Contractor in order to meet Program Work schedules and existing Program Work conditions including the minimization of interference with the mission of the Agency. It is not necessary to work a day shift in order to schedule a second or third shift, or a second shift in order to schedule a third shift, or to schedule all of the crafts when only certain crafts or employees are needed. Shifts must have prior approval of the Agency or Construction Manager and must be scheduled with not less than five workdays' notice to the Local Union or such lesser notice as may be mutually agreed upon.

B. Second and/or Third Shifts - The second shift shall start between 3 p.m. and 6 p.m. and the third shift shall start between 11 p.m. and 2 a.m., subject to different times necessitated by the Agency phasing plans on specific projects. There shall be no reduction in shift hour work. With respect to second and third shift work performed Monday—Friday on renovation and rehabilitation projects, there shall be a 5% shift premium, or the rate required by the applicable prevailing wage laws, whichever is less. With respect to second shift work performed Monday – Friday on new construction projects, there shall be a 10% shift premium, or the rate required by applicable prevailing wage laws, whichever is less. With respect to third shift work on work performed Monday – Friday on new construction projects, there shall be a 15% shift premium, or the rate required by applicable prevailing wage laws, whichever is less. No other premium or other payments for such work shall be required unless such work is in excess of the employee's regularly

scheduled work week, i.e., forty (40) hours in the week or thirty-five (35) or thirty-seven and one half (37 ½) pursuant to Article 12, Section 1(A). All employees within the same classification performing Program Work will be paid at the same wage rate regardless of the shift or work, subject only to the foregoing provisions.

C. Flexible Starting Times - Shift starting times will be adjusted by the Contractor as necessary to fulfill Program Work requirements subject to the notice requirements of paragraph A.

SECTION 4. HOLIDAYS

A. Schedule - There shall be nine (9) recognized holidays on the project:

New Year's Day

Martin Luther King Day	President's Day
Memorial Day	Veteran's Day
Labor Day	Thanksgiving Day
Independence Day	Christmas Day

All said holidays shall be observed on the calendar date except those holidays which occur on Saturday shall be observed on the previous Friday and those that occur on Sunday shall be observed on the following Monday.

B. Payment - Regular holiday pay, if any, for work performed on such a PLA recognized holiday shall be in accordance with the applicable Schedule "A" for work performed on a holiday, even where the PLA holiday differs from the CBA holidays.

C. Exclusivity - No holidays other than those listed in Section 4(A) above shall be recognized or observed.

SECTION 5. MAKE-UP DAYS

When severe weather, power failure, fire or natural disaster or other similar circumstances beyond the control of the Contractor prevent work from being performed on a regularly scheduled weekday, the Contractor may schedule a Saturday make-up day (or Friday make-up day in the case of a 4/10 schedule) and such time shall be scheduled and paid as if performed on a weekday. Any other Saturday work shall be paid at time and one-half (1½). The Contractor shall notify the Local Union on the missed day or as soon thereafter as practicable if such a make-up day is to be worked.

SECTION 6. REPORTING PAY

A. Employees who report to the work location pursuant to their regular schedule and who are not provided with work shall be paid two hours reporting pay at straight time rates. An employee whose work is terminated early by a Contractor due to severe weather, power failure, fire or natural disaster of for similar circumstances beyond the Contractor's control, shall receive pay only for such time as is actually worked. In other instances, in which an employee's work is terminated early (unless provided otherwise elsewhere in this Agreement), the employee shall be paid for their full shift. Contractors shall not be permitted to call, text or email or voicemail employees in advance of their regularly scheduled shift starting time to avoid reporting pay. Notwithstanding the above, in the event that the National Weather Service issues a weather advisory for the area in which the work location is situated, and the entire project is shut down as a result of the Weather Advisory, the Contractor shall be permitted to speak to employees no less than four (4) hours in advance of their shift starting time, unless the Local Union consents to a shorter notice in writing, to advise them not to report to work due to the National Weather Service advisory, and employees who are so notified shall not receive two (2) hours reporting pay if they report to the work location. The Contractor shall make every effort to notify each employee

directly and confirm that notification has been received. Voice, text, and email messages left for employees without confirmation of delivery and receipt by employee do not constitute sufficient notice under this provision.

B. When an employee, who has completed their scheduled shift and left the Program Work site, is "called out" to perform special work of a casual, incidental or irregular nature, the employee shall receive overtime pay at the rate of time and one-half of the employee's straight time rate for hours actually worked.

C. When an employee leaves the job or work location of their own volition or is discharged for cause or is not working as a result of the Contractor's invocation of Section 7 below, they shall be paid only for the actual time worked.

D. Except as specifically set forth in this Article there shall be no premiums, bonuses, hazardous duty, high time or other special premium payments or reduction in shift hours of any kind.

E. There shall be no pay for time not actually worked except as specifically set forth in this Article and except where an applicable Schedule "A" CBA requires a full weeks' pay for forepersons.

SECTION 7. PAYMENT OF WAGES

A. Termination - Employees who are laid off or discharged for cause shall be paid in full for that which is due them at the time of termination. The Contractor shall also provide the employee with a written statement setting forth the date of layoff or discharge.

SECTION 8. EMERGENCY WORK SUSPENSION

A Contractor may, if considered necessary for the protection of life and/or safety of employees or others, suspend all or a portion of Program Work. In such instances, employees will

be paid for actual time worked, except that when a Contractor requests that employees remain at the job site available for work, employees will be paid for that time at their hourly rate of pay.

SECTION 9. INJURY/DISABILITY

An employee who, after commencing work, suffers a work-related injury or disability while performing work duties, shall receive no less than a full day's pay in accordance with the employee's regularly scheduled workday under Article 12, Section (1)(A). Further, the employee shall be rehired at such time as able to return to duties provided there is still Program Work available for which the employee is qualified and able to perform.

SECTION 10. TIME KEEPING

A Contractor may utilize systems to check employees in and out. Each employee must check in and out and sign a daily sign-in sheet, or other attendance methodology approved in writing by the Agency(s). The Contractor will provide adequate facilities for checking in and out in an expeditious manner.

SECTION 11. MEAL PERIOD

A Contractor shall schedule an unpaid period of not more than 1/2-hour duration at the work location between the 3rd and 5th hour of the scheduled shift. A Contractor may, for efficiency of operation, establish a schedule which coordinates the meal periods of two or more crafts, or which provides for staggered lunch periods within a craft or trade. If an employee is required to work through the meal period, the employee shall be compensated in a manner established in the applicable Schedule "A" CBA.

SECTION 12. BREAK PERIODS

There will be no rest periods, organized coffee breaks or other non-working time established during working hours. Individual coffee containers will be permitted at the employee's

work location. Where 4/10s are being worked, there shall be a morning and an afternoon coffee break.

ARTICLE 13 - APPRENTICES AND WORKFORCE DEVELOPMENT

SECTION 1. APPRENTICE RATIOS AND REFERRALS

A. Recognizing the need to maintain continuing supportive programs designed to develop adequate numbers of competent workers in the construction industry and to provide craft entry opportunities for minorities, women and economically disadvantaged non-minority males, Contractors will employ apprentices in their respective crafts to perform such work as is within their capabilities and which is customarily performed by the craft in which they are indentured. Contractors may utilize apprentices and such other appropriate classifications in the maximum ratio permitted by the New York State Department of Labor ("NYSDOL"), or the maximum allowed per trade. Apprentices and such other classifications as are appropriate shall be employed in a manner consistent with the provisions of the appropriate Schedule "A" CBA. The parties encourage, as an appropriate source of apprentice recruitment consistent with the rules and operations of the affiliated unions' apprentice-programs, the use of the Edward J. Malloy Initiative for Construction Skills, Non-Traditional Employment for Women, New York Helmets to Hardhats, and Pathways to Apprenticeship (P2A). Should a Contractor request that apprentices be provided for Program Work, the referring Local Union shall comply with that request so long as it is consistent with the maximum ratios permitted by NYSDOL. Where the Agency sets forth goals regarding Residence-Based Community Hire apprentices, the Contractor shall request such Residence-Based Community Hire apprentices from the Local Union so long as it is consistent with the maximum ratios permitted by NYSDOL.

SECTION 2. WORKFORCE DEVELOPMENT

A. The parties to this Agreement recognize the mutual interest in increasing training

and career opportunities for Residence-Based Community Hires. The parties are committed to (i) increasing opportunities for Residence-Based Community Hires in pre-apprenticeship and apprenticeship programs, and (ii) using the work opportunities provided by this Agreement to increase the career opportunities for qualified Residence-Based Community Hires, and (iii) assuring the continued availability of a skilled and qualified, readily available construction workforce for this program and future work.

B. Specifically, the parties have established an initiative entitled Community Hiring Construction Careers, which is an initiative to advance career opportunities for Residence-Based Community Hires.

C. The Community Hiring Construction Careers initiative will work with the Office of Talent and Workforce Development ("NYC Talent") and the City's Workforce1 Centers to recruit Residence-Based Community Hires interested in employment in the construction industry.

D. Community Hiring Construction Careers intends to capitalize on the work opportunities presented by this Agreement to create a pathway to career opportunities in the construction workforce. To this end the Community Hiring Construction Careers initiative includes a workforce goal of at least 30% of all hours worked under this Agreement, including by subcontractors pursuant to Article 3, Section 1(b)(12) and Article 4, Sections 2(B) and (C), to be worked by Residence-Based Community Hires. Where the Agency sets forth workforce goals in its solicitation, Contractors shall request Residence-Based Community Hires from the Local Unions to achieve the required workforce goal.

E. In order to encourage recruitment of new workers, Community Hiring Construction Careers has established a goal that at least 30% of all of those hours are to be worked

by apprentices who are Residence-Based Community Hires.

F. The Contractors and Unions agree to cooperate and participate in the implementation of Community Hiring Construction Careers to assist Residence-Based Community Hires with educational and training opportunities related to access to pre-apprenticeship, apprenticeship, and Program Work as set forth in this Agreement.

G. Reporting Requirements:

i. The Contractors shall report the residence zip code information on all certified payroll reports and any additional information regarding Residence-Based Community Hires that may be required by rule or law.

ii. The Local Unions, their referral systems, the affiliated pre-apprentice programs, and Contractors shall cooperate with any protocol developed for monitoring the Community Hiring Construction Careers initiative.

H. The City and BCTC agree that no less than annually, the LMC shall review the implementation of Community Hiring Construction Careers, as well as Residence-Based Community Hire opportunities afforded as a result of the initiative. The City and BCTC will collaborate to develop monitoring protocol for the purpose of measuring the success of Community Hiring Construction Careers. The City and BCTC may, on mutual consent, modify the goals, procedures and protocols, as necessary to afford continued opportunity to Residence-Based Community Hires.

I. To facilitate the commitments set forth in this Agreement, each Local Union shall designate a Community Hiring Construction Careers lead representative to work in partnership with NYC Talent to implement these workforce and apprenticeship provisions within the union

and across City construction contracts.

ARTICLE 14 - SAFETY PROTECTION OF PERSON AND PROPERTY

SECTION 1. SAFETY REQUIREMENTS

Each Contractor will ensure that applicable OSHA and safety requirements are at all times maintained on the Program Work site and the employees and Unions agree to cooperate fully with these efforts to the extent consistent with their rights and obligations under the law. Employees will cooperate with employer safety policies and will perform their work at all times in a safe manner and protect themselves and the property of the Contractor and Agency from injury or harm, to the extent consistent with their rights and obligations under the law. Failure to do so will be grounds for discipline, including discharge. The Construction Manager and/or Contractor may adopt, and the Unions shall agree to, the Drug and Alcohol Testing Policy attached as Schedule "B".

SECTION 2. CONTRACTOR RULES

Employees covered by this Agreement shall at all times be bound by the reasonable safety, security, and visitor rules as established by the Contractors and the Construction Manager for Program Work. Such rules will be published and posted in conspicuous places throughout the Program Work sites. Any site security and access policies established by the Construction Manager or General Contractor intended for specific application to the construction workforce for Program Work and that are not established pursuant to an Agency directive shall be implemented only after notice to the BCTC and its affiliates and an opportunity for negotiation and resolution by the Labor Management Committee.

SECTION 3. INSPECTIONS

The Contractors and Construction Manager retain the right to inspect incoming shipments of equipment, apparatus, machinery and construction materials of every kind.

ARTICLE 15 - TEMPORARY SERVICES

SECTION 1.

Temporary services, i.e. all temporary heat, climate control, water, power and light, shall only be required upon the determination of the Agency or Construction Manager, and when used shall be staffed and assigned to the appropriate trade(s) with jurisdiction. Temporary services shall be provided by the appropriate Contractors' existing employees during working hours in which a shift is scheduled for employees of the Contractor. The Agency or Construction Manager may determine the need for temporary services requirements during non-working hours, and when used shall be staffed and assigned to the appropriate trades(s), and which may be limited to one person per applicable trade where practicable. There shall be no stacking of trades on temporary services, provided this does not constitute a waiver of primary trade jurisdiction. In the event a temporary system component is claimed by multiple trades, the matter shall be resolved through the New York Plan for Jurisdictional Disputes.

ARTICLE 16 - NO DISCRIMINATION

SECTION 1. COOPERATIVE EFFORTS

The Contractors and Unions agree that they will not discriminate against any employee or applicant for employment because of creed, race, color, religion, sex, sexual orientation, national origin, marital status, citizenship status, disability, gender identity, age or any other status provided by law, in any manner prohibited by law or regulation.

SECTION 2. LANGUAGE OF AGREEMENT

Any words signifying any gender shall be interpreted to mean any or all gender identities.

ARTICLE 17 - GENERAL TERMS

SECTION 1. PROJECT RULES

A. The Construction Manager and the Contractors shall establish such reasonable Program Work rules that are not inconsistent with this Agreement or rules common in the industry and are reasonably related to the nature of work. These rules will be explained at the pre-job conference and posted at the Program Work sites and may be amended thereafter as necessary. Notice of amendments will be provided to the appropriate Local Union. Failure of an employee to observe these rules and regulations shall be grounds for discipline, including discharge. The fact that no order was posted prohibiting a certain type of misconduct shall not be a defense to an employee disciplined or discharged for such misconduct when the action taken is for cause.

B. The parties adopt and incorporate the BCTC's Standards of Excellence as annexed hereto as Exhibit "B".

SECTION 2. TOOLS OF THE TRADE

The welding/cutting torch and chain fall are tools of the trade having jurisdiction over the work performed. Employees using these tools shall perform any of the work of the trade. There shall be no restrictions on the emergency use of any tools or equipment by any qualified employee or on the use of any tools or equipment for the performance of work within the employee's jurisdiction.

SECTION 3. SUPERVISION

Employees shall work under the supervision of the craft foreperson or general foreperson.

SECTION 4. TRAVEL ALLOWANCES

There shall be no payments for travel expenses, travel time, subsistence allowance or other such reimbursements or special pay except as expressly set forth in this Agreement.

SECTION 5. FULL WORKDAY

Employees shall be at their work area at the starting time established by the Contractor, provided they are provided access to the work area. The signatories reaffirm their policy of a fair day's work for a fair day's wage.

SECTION 6. COOPERATION AND WAIVER

The Construction Manager, Contractors and the Unions will cooperate in seeking any NYSDOL, or any other government, approvals that may be needed for implementation of any terms of this Agreement. In addition, the Council, on their own behalf and on behalf of its participating affiliated Local Unions and their individual members, intend the provisions of this Agreement to control to the greatest extent permitted by law, notwithstanding contrary provisions of any applicable prevailing wage, or other, law and intend this Agreement to constitute a waiver of any such prevailing wage, or other, law to the greatest extent permissible only for work within the scope of this Agreement, including specifically, but not limited to those provisions relating to shift, night, and similar differentials and premiums. This Agreement does not, however, constitute a waiver or modification of the prevailing wage schedules applicable to work not covered by this Agreement.

ARTICLE 18 - SAVINGS AND SEPARABILITY

SECTION 1. THIS AGREEMENT

In the event that the application of any provision of this Agreement is enjoined, on either an interlocutory or permanent basis, or is otherwise determined to be in violation of law, or if such application may cause the loss of project funding or any New York State Labor Law exemption for all or any part of the Program Work, the provision or provisions involved (and/or its application to particular Program Work, as necessary) shall be rendered, temporarily or permanently, null and void, but where practicable the remainder of the Agreement shall remain in full force and effect to

the extent allowed by law (and to the extent no funding or exemption is lost), unless the part or parts so found to be in violation of law or to cause such loss are wholly inseparable from the remaining portions of the Agreement and/or are material to the purposes of the Agreement. In the event a court of competent jurisdiction finds any portion of the Agreement to trigger the foregoing, the parties will immediately enter into negotiations concerning the substance affected by such decision for the purpose of achieving conformity with the court determination and the intent of the parties hereto for contracts to be let in the future.

SECTION 2. THE BID SPECIFICATIONS

In the event that the Agency's (or Construction Manager's) bid specifications, or other action, requiring that a successful bidder (and subcontractor) become signatory to this Agreement is enjoined, on either an interlocutory or permanent basis, or is otherwise determined to be in violation of law, or may cause the loss of project funding or any New York State Labor Law exemption for all or any part of the Program Work, such requirement (and/or its application to particular Program Work, as necessary) shall be rendered, temporarily or permanently, null and void, but where practicable the Agreement shall remain in full force and effect to the extent allowed by law and to the extent no funding or exemption is lost. In such event, the Agreement shall remain in effect for contracts already bid and awarded or in construction only where the Agency and Contractor voluntarily accepts the Agreement. The parties will enter into negotiations as to modifications to the Agreement to reflect the court or other action taken and the intent of the parties for contracts to be let in the future.

SECTION 3. NON-LIABILITY

In the event of an occurrence referenced in Section 1 or Section 2 of this Article, neither the Agency, the Construction Manager, any Contractor, nor any Union shall be liable, directly or

indirectly, for any action taken, or not taken, to comply with any court order or injunction, other determination, or in order to maintain funding or a New York State Labor Law exemption for Program Work. Bid specifications will be issued in conformance with court orders then in effect and no retroactive payments or other action will be required if the original court determination is ultimately reversed.

SECTION 4. NON-WAIVER

Nothing in this Article shall be construed as waiving the prohibitions of Article 7 as to signatory Contractors and signatory Unions.

ARTICLE 19 - FUTURE CHANGES IN SCHEDULE "A" AREA CONTRACTS

SECTION 1. CHANGES TO AREA CONTRACTS

A. Schedule "A" to this Agreement shall continue in full force and effect until the Contractor and/or Union parties to the Area CBAs that are the basis for the Schedule "A" notify the Mayor's Office of Contract Services ("MOCS"), Agency and Construction Manager in writing by providing a copy of the updated CBA(s) incorporating the changes agreed to in that Area CBA which are applicable to work covered by this Agreement and their effective dates.

B. It is agreed that any provisions negotiated into Schedule "A" CBAs will not apply to work under this Agreement if such provisions are less favorable to those uniformly required of contractors for construction work normally covered by those agreements; nor shall any provision be recognized or applied on Program Work if it may be construed to apply exclusively, or predominantly, to work covered by this Agreement.

C. Any disagreement between signatories to this Agreement over the incorporation into Schedule "A" of provisions agreed upon in the renegotiation of Area CBAs shall be resolved in accordance with the procedure set forth in Article 9 of this Agreement.

SECTION 2. LABOR DISPUTES DURING AREA CONTRACT NEGOTIATIONS

The Unions agree that there will be no strikes, work stoppages, sympathy actions, picketing, slowdowns or other disruptive activity or other violations of Article 7 affecting the Program Work by any Local Union involved in the renegotiation of Area Local CBAs nor shall there be any lock-out on such Program Work affecting a Local Union during the course of such renegotiations.

ARTICLE 20 - WORKERS' COMPENSATION ADR

SECTION 1.

A. An Alternative Dispute Resolution ("ADR") program may be instituted by a Contractor and participation in such an ADR program will be optional by trade.

B. The BCTC acknowledges that there may be some instances where an Agency seeks to institute an ADR program for disputes regarding Workers' Compensation claims for work performed under certain Contracts performed under this Agreement. Where an Agency seeks to utilize an ADR program for a project it shall notify the BCTC and the BCTC and the City shall enter into negotiations over the terms and conditions of such ADR program. No such program shall be instituted without the full and complete agreement of the BCTC, and the City, including the applicable Agency. If an ADR program is agreed to by the BCTC and the City, including the applicable Agency, for a project performed under this Agreement, all Contractors shall require their employees to participate.

ARTICLE 21 - HELMETS TO HARDHATS

SECTION 1.

The Contractors and the Unions recognize a desire to facilitate the entry into the building and construction trades of veterans who are interested in careers in the building and construction industry. The Contractors and Unions agree to utilize the services of the New York City Helmets

to Hardhats Program ("H2H") to serve as a resource for preliminary orientation, assessment of construction aptitude, referral to apprenticeship programs or hiring halls, counseling and mentoring, support network, employment opportunities and other needs as identified by the parties.

SECTION 2.

The Unions and Contractors agree to coordinate with H2H to create and maintain an integrated database of veterans interested in working on this project and of apprenticeship and employment opportunities for this project. To the extent permitted by law, the Unions will give credit to such veterans for bona fide, provable past experience.

[THIS SPACE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF the parties have caused this Agreement to be executed and effective as of the ___ day of_____, _____.

FOR BUILDING AND CONSTRUCTION TRADES COUNCIL
OF GREATER NEW YORK AND VICINITY

BY: _____
Gary LaBarbera
President

FOR NEW YORK CITY

BY: _____
Randy Mastro
First Deputy Mayor

APPROVED AS TO FORM:

KF

_____
ACTING CORPORATION
COUNSEL NEW YORK CITY

Date: 11/5/2025

LIST OF SIGNATORY UNIONS
International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers, AFL-CIO, Local Lodge No.5
Bricklayers and Allied Craftworkers, Local Union No. 1
Building Concrete & Excavating Laborers, Local Union No. 731
N.Y.C. and Vicinity District Council of Carpenters
Cement Masons, Local Union No. 780
Concrete Workers District Council No. 16
Asbestos, Lead & Hazardous Waste, Laborers Local Union No. 78
Construction & General Building Laborers Local Union No. 79
Derrickmen and Riggers Local Union No. 197
International Brotherhood of Electrical Workers, Local Union No. 3
International Union of Elevator Constructors, Local Union No. 1
Heat & Frost Insulators & Allied Workers, Local Union No. 12
Heat & Frost Insulators & Allied Workers, Local Union No. 12A
Pavers & Road Builders, Laborers Local Union No. 1010
New York State Iron Workers District Council
Structural Iron Workers, Local Union No. 40
Structural Iron Workers, Local Union No. 361
Mason Tenders District Council
Metallic Lathers & Reinforcing Ironworkers, Local No. 46
Ornamental Iron Workers, Local Union No. 580
Glaziers No. 1087, District Council 9
Painters, District Council No. 9
Metal Polishers, Local Union No. 8A-28A; District Council No. 9
Drywall Tapers Local Union No 1974, District Council 9
Bridge & Structural Steel Painters, Local Union No. 806, District Council 9
Operative Plasterers Local Union No. 262
UA Plumbers Local Union No. 1
Private Sanitation, Teamsters Local Union No. 813
Roofers & Waterproofers, Local Union No. 8
Sheet Metal Workers, Local Union No. 28
Sheet Metal Workers, Local Union No. 137
UA Steamfitters, Local Union No. 638
Teamsters, Local Union No. 282
Tile, Marble & Terrazzo, B.A.C. Local Union No. 7

SCHEDULE "A" - CBAS

Union	Current Agreement w/
Architectural and Ornamental Iron Workers Local Union 580, AFL-CIO	Allied Building Metal Industries, Inc.
Building, Concrete, Excavating & Common Laborers Local 731	Independent
Building, Concrete, Excavating & Common Laborers Local 731	Members of the General Contractors Association of New York, Inc.
Bricklayers Local 1 of the International Union of Bricklayers and Allied Craftworkers	Independent
District Council No. 9, I.U.P.A.T Glaziers Local 1087	Window and Plate Glass Dealers Association
Drywall Tapers and Painters Local 1974, affiliated with International Union of Painters & Allied Trades and Drywall Taping Contractor's Association & Association of Wall-Ceiling & Carpentry Industries NY, Inc.	Independent
Enterprise Association of Steamfitters and Apprentices Local 638	Mechanical Contractors Association of NY, Inc.
Enterprise Association of Steamfitters and Apprentices Local 638	Independent
Elevator Constructors Local 1 of NY and NJ	ThyssenKrupp Elevator Corporation
Elevator Constructors Local 1 of NY and NJ	Independent
Highway Road and Street Laborers Local Union 1010 of the District Council of Pavers and Road Builders of the Laborers' International Union of North America AFL-CIO	Independent
Highway Road and Street Laborers Local Union 1010 of the District Council of Pavers and Road Builders of the Laborers' International Union of North America AFL-CIO	Member of the General Contractors Association of New York, Inc.
International Association of Heat and Frost Insulators and Allied Workers Local No. 12 of New York City	Independent

International Association of Heat and Frost Insulators and Allied Workers Local No. 12 of New York City	The Insulation Contractors Association of New York City, Inc.
International Association of Heat and Frost Insulators and Allied Workers Local No. 12A of New York City	Independent
International Association of Heat and Frost Insulators and Allied Workers Local No. 12A of New York City	Environmental Contractors Association, Inc.
International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers, AFL-CIO, Local Lodge No. 5	Boilermakers Association of Greater New York
Local Union No. 3 International Brotherhood of Electrical Workers, AFL-CIO	New York Electrical Contractors Association
International Brotherhood of Teamsters, Local 282, High Rise Contract	Building Contractors Association & Independents
International Brotherhood of Teamsters, Local 282, High Rise Contract	General Contractors Association
Local 46 Metallic Lathers Union and Reinforcing Iron Workers of NY and Vicinity of the International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers	General Contractors Association
Local 46 Metallic Lathers Union and Reinforcing Iron Workers of NY and Vicinity of the International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers	Independent
Local 8 Roofers, Waterproofers & Allied Workers	Roofing and Waterproofing Contractors Association of New York and Vicinity
Local Union 1 of the United Association of Journeymen and Apprentices of the Pipe Fitting Industry of the United States and Canada	Association of Contracting Plumbers of the City of New York
Local Union 1 of the United Association of Journeymen and Apprentices of the Pipe Fitting Industry of the United States and Canada	Independent
Local Union Number 40 & 361 of Bridge, Structural Ornamental and Reinforcing Iron Workers AFL-CIO	Independent

Mason Tenders DC & Laborers' International Union – Local 78 & 79	Building Contractors Association
Mason Tenders DC & Laborers' International Union – Local 78 & 79	Interior Demolition Contractors Association
Mason Tenders DC & Laborers' International Union – Local 78 & 79	Independent
Mason Tenders DC & Laborers' International Union – Local 78 & 79	NYCDCA
Mason Tenders DC & Laborers' International Union – Local 78 & 79	Environmental Contractors Association
Mason Tenders DC & Laborers' International Union – Local 78 & 79	ABMC
Operative Plasterers' and Cement Masons' International Association Local No. 262	Independent
Painters and Allied Trades AFL-CIO, District Council No. 9 (Painting and Protective Coatings CBA)	Independent
Painters and Allied Trades AFL-CIO, District Council No. 9 (Painting and Protective Coatings CBA)	The Association of Master Painters & Decorators of NY, Inc. and The Association of Wall, Ceiling & Carpentry Industries of NY, Inc. and The Window and Plate Glass Dealers Association
Sheet Metal Workers' International Association, Local 28	Sheet Metal & Air Conditioning Contractors Association of New York City, Inc.
Sheet Metal Workers' International Association, Local 137	The Greater New York Sign Association
Structural Steel and Bridge Painters Local 806, DC 9 International Union of Painters and Allied Trades, AFL-CIO	New York Structural Steel Painting Contractors Association
Teamsters Local 813	Independent
Teamsters Local 813	IESI NY Corporation
The Cement Masons' Union, Local 780	Cement League
The District Council of Cement and Concrete Workers (comprised of Local 6A; Local 18A and Local 20)	Cement League

The District Council of Cement and Concrete Workers (comprised of Local 6A; Local 18A and Local 20)	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Heavy Carpenters	GCA
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Dockbuilders Local No. 1556	Concrete Contractors of NY
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Dockbuilders Local 1556	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Millwright Local 740	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Timbermen Local 1556	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Timbermen Local 1556	GCA
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Heavy Carpenters	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Carpenters	Manufacturing Woodworkers Association of Greater New York Incorporated
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America	The Hoisting Trade Association of New York, Inc.
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America	The Test Boring Association
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America	Building Contractors Association

The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America	The Association of Wall-Ceiling & Carpentry Industries of New York, Incorporated
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners	The Cement League
The District Council of NYC and Vicinity of the United Brotherhood of Carpenters and Joiners of America	New York City Millwright Association
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners	Greater New York Floor Covering Association
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Carpenters	Association of Architectural Metal & Glass
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Carpenters	Concrete Contractors of NY
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Building Construction Carpenters	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Local 2287	Independent
The District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America for Shop Carpenters	Independent
The Tile Setters and Tile Finishers Union of New York and New Jersey, Local 7 of the International Bricklayers and Allied Craftworkers	The Greater New York and New Jersey Contractors Association
United Derrickmen & Riggers Association, Local 197 of NY, LI, Westchester & Vicinity	Contracting Stonesetters Association Inc.
United Derrickmen & Riggers Association Local 197 of NY, LI, Westchester and Vicinity	Building Stone and Pre-cast Contractors Association

Exhibit A

Project Labor Agreement - Letter of Assent

Dear: _____

The undersigned party confirms that it agrees to be a party to and be bound by the New York Agency, Project Labor Agreement as such Agreement may, from time to time, be amended by the parties or interpreted pursuant to its terms. The terms of the Project Labor Agreement, its Schedules, Addenda and Exhibits are hereby incorporated by reference herein.

The undersigned, as a Contractor or Subcontractor (hereinafter Contractor) on the Project known as the 2025 NYC Agency Citywide Renovation & New Construction PLA and located at _____ (hereinafter PROJECT), for and in consideration of the award to it of a contract to perform work on said PROJECT, and in further consideration of the mutual promises made in the Project Labor Agreement, a copy of which was received and is acknowledged, hereby:

(1) Accepts and agrees to be bound by the terms and conditions of the Agreement, together with any and all schedules; amendments and supplements now existing or which are later made thereto:

(2) Agrees to be bound by the legally established collective bargaining agreements; local trust agreements for employee benefit funds; and trust documents for joint apprentice programs as well as apprentice program rules and procedures but only to the extent of Program Work and as required by the PLA.

(3) Authorizes the parties to such local trust agreements to appoint trustees and successor trustees to administer the trust funds and hereby ratifies and accepts the trustees so appointed as if made by the Contractor but only to the extent of Program Work as required by the PLA.

(4) Certifies that it has no commitments or agreements that would preclude its full and complete compliance with the terms and conditions of said Agreement. The Contractor agrees to employ labor that can work in harmony with all other labor on the Project and shall require labor harmony from every lower tier subcontractor it has engaged or may engage to work on the Project. Labor harmony disputes/issues shall be subject to the Labor Management Committee provisions.

(5) Agrees to secure from any Contractor(s) (as defined in said Agreement) which is or becomes a Subcontractor (of any tier), to it, a duly executed Agreement to be Bound in from identical to this document.

Provide description of the Work, identify craft jurisdiction(s) and all contract numbers below:

Local Union: _____

Description of Work: _____

_____

Contract Number(s): _____

Dated: _____

_____
(Name of Contractor or Subcontractor)

_____
(Name of CM; GC; Contractor or Higher Level Subcontractor)

_____
(Authorized Officer & Title)

_____
(Address)

_____
(Signature)

_____
(Phone) (Fax)

Contractor's State License #_____

Sworn to before me this
____ day of _____,

_____
Notary Public

Exhibit B

NEW YORK CITY BUILDING AND CONSTRUCTION TRADES COUNCIL STANDARDS OF EXCELLENCE

The purpose of this Standard of Excellence is to reinforce the pride of every construction worker and the commitment to be the most skilled, most productive and safest workforce available to construction employers and users in the City of New York. It is the commitment of every affiliated local union to use our training and skills to produce the highest quality work and to exercise safe and productive work practices.

The rank and file members represented by the affiliated local unions acknowledge and adopt the following standards:

- ***Provide a full day's work for a full days pay;***
- ***Safely work towards the timely completion of the job;***
- ***Arrive to work on time and work until the contractual quitting time;***
- ***Adhere to contractual lunch and break times;***
- ***Promote a drug and alcohol free work site;***
- ***Work in accordance with all applicable safety rules and procedures;***
- ***Allow union representatives to handle job site disputes and grievances without resort to slowdowns, or unlawful job disruptions;***
- ***Respect management directives that are safe, reasonable and legitimate;***
- ***Respect the rights of co-workers;***
- ***Respect the property rights of the owner, management and contractors.***

The Unions affiliated with the New York City Building and Construction Trades Council will expect the signatory contractors to safely and efficiently manage their jobs and the unions see this as a corresponding obligation of the contractors under this Standard of Excellence. The affiliated unions will expect the following from its signatory contractors:

- ***Management adherence to the collective bargaining agreements;***
- ***Communication and cooperation with the trade foremen and stewards;***
- ***Efficient, safe and sanitary management of the job site;***
- ***Efficient job scheduling to mitigate and minimize unproductive time;***
- ***Efficient and adequate staffing by properly trained employees by trade;***
- ***Efficient delivery schedules and availability of equipment and tools to ensure efficient job progress;***
- ***Ensure proper blueprints, specifications and layout instructions and material are available in a timely manner***
- ***Promote job site dispute resolution and leadership skills to mitigate such disputes;***
- ***Treatment of all employees in a respectful and dignified manner acknowledging their contributions to a successful project.***

The affiliated unions and their signatory contractors shall ensure that both the rank and file members and the management staff shall be properly trained in the obligations undertaken in the Standard of Excellence.

Exhibit "C" – Community Hiring Construction Careers

Non-exhaustive list of ZIP codes where at least 15% of the population lives below the federal poverty threshold (ZIP codes within ~100 mile radius of NYC)

Zip Code	State	County

The Office of Community Hiring and Workforce Development maintains and publishes the list of Economically Disadvantaged Regions in accordance with Section 3502(b) of the New York City Charter. The list of Economically Disadvantaged Regions within a 100-mi. radius of the city, in a format similar to the above, will be provided for each fiscal year.

Division of Labor DEP Centrifuge Contract

BLACK= Union Millwright

RED= Centrifuge Technicians

I. Scheduled Preventative Maintenance of The Centrifuge System

1. Preliminary centrifuge monitoring, operation and readings before scheduled PM

i. As part of the centrifuge system evaluation to produce a PM report and while still in operation, take vibration, temperature readings, monitor torque and back-drive conditions prior to shutdown of the centrifuge system. In addition, evaluate the operation and condition of the pneumatic knife gate and cake cross conveyor. Queries are made with plant operations and maintenance staff asking for a history with operation of the system, mechanical, electrical and issues of the centrifuge system in general.

ii. If necessary, based on the results of monitoring differential while process sludge, a pressure test is performed on the Rexroth hydraulic pump and or the Rotodiff hydraulic motor to determine if there are internal mechanical issues that require replacement of said components

2. Remove and prepare rotating assembly for yearly maintenance

i. Shut down centrifuge system and coordinate with the owner for lock out tag out of system

ii. Remove belt guards and frame case top

iii. Remove hoses, drive belts and disconnect RTD wiring associated with the rotating assembly Remove the Rotodiff (hydraulic motor)

iv. Remove the rotating assembly from the base using overhead crane

3. Disassembly/Assembly of the rotating assembly:

i. Remove the liquid headwall

ii. Remove the scroll

iii. Mechanical de-scaling of rotating assembly rotor, headwall and scroll with a needle gun.

iv. Inspect all components. Check critical dimensions with instruments and verify to print key components or components that appear worn and or damaged.

v. Inspect internal bowl strips that run the length of the bowl. Change bushings wear liners & wear shoes. If necessary, remove the bowl strip welds with a grinder and weld new strips. Weld minor repairs on scroll when necessary. If necessary, repair the hard-face protection on the conveyor blades with addition of hard surface. Clean return tubes on the conveyor.

vi. Replace o-rings, seals and scroll bearings. Bearings are installed using factory procedure that specifies heat tolerances for bearing inner race and proper placement of bearing race on fit surfaces.

vii. Prime paint bare steel components

viii. Assemble and check stack-up dimension of scroll bearings
ix. Install scroll into outer bowl assembly using conveyor extractor tool, overhead crane.
x. Check conveyor stack-up dimension
xi. Assemble headwall
xii. Check for scroll clearance by rotating scroll with spline shaft
xiii. Install stellite wear shoes with epoxy adhesive.

4. **Service and repair of centrifuge frame top and bottom**
   i. Scrape process material from frame bottom and top
   ii. Mechanical de-scaling of the inside frame bottom and top using a needle gun
   iii. If required, welding repair panels on the outer and internal portions of the frame top and bottom. Also, replacing baffles with stainless steel baffles; requiring flame burning off old baffles, grinding to fit and welding new baffles
   iv. Checking case bottom threaded holes and repairing with thread inserts
   v. Painting case top and bottom: prime and applying two part epoxy paint

5. **Back –Drive and Main Bearing Lubrication System Maintenance**
   i. Drain back-drive oil and bearing lubrication oil reservoirs
   ii. Scrape clean reservoirs internally
   iii. When required, replace heat exchangers, dials, solenoids or fittings
   iv. Replace filters
   v. When required, replace hoses
   vi. Replenish reservoirs with new oil

6. **Service main drive and back-drive motors**
   a) Remove covers and clean cooling fan
   b) Check run-out and condition of drive end bearing on the main drive motor. If there is an internal problem with the motor, it is sent to a motor repair center for service.
   c) Grease bearings
   d) Check condition of bearing RTD and replace if necessary

7. **Service the Voith fluid coupling**
   i. Clean fluid coupling exterior surface
   ii. Drain and change the ATF fluid. Inspect condition of the drained fluid for possible internal mechanical issues.
   iii. Remove the fluid coupling with a factory pulling device from the main drive motor shaft.
   iv. Remove the sheave and bearing housing from the fluid coupling.
   v. Remove the old grease from the bearing housing, clean the bearing with rags and solvent.
   vi. Repack the bearing housing with grease
   vii. Install the fluid coupling on the motor shaft
   viii. Replenish fluid to the factory level.
   ix. Verify the Voith BTS proximity sensor gap. Adjust necessary
   x. Verify the milliamp signal at the BTS junction box terminal. Adjust the gap accordingly to bring the milliamp reading to factory specifications. If this adjustment cannot be done to

bring it to factory specification, then the switching element and or the initiator may have to be replaced.

8. **After evaluation, and when necessary, rebuild the pneumatic knife gate**
   i. Assemble custom scaffolding under the centrifuge on the lower level
   ii. Disassemble all knife gate components
   iii. Replace all components
   iv. Test operation of knife gate and adjust if necessary

9. **After evaluation, and when necessary, rebuild the cake cross conveyor system**
   i. Assemble staging and scaffolding
   ii. Disassemble all cross conveyor components
   iii. Replace all mechanical and electrical components
   iv. Check electrical and pneumatic connections
   v. Test operation of cross conveyor in manual mode, troubleshoot and adjust if necessary
   vi. Verify operation of cross conveyor while the centrifuge produces cake.

10. **After evaluation, and when necessary, replace the hydraulic pump and or the Roto-diff hydraulic motor**
   i. Remove the components: hydraulic pump and or Rotodiff
   ii. Install the hydraulic pump: check drive alignment, test units and adjust for mechanical base RPM and squash plate indicator. Verify by monitoring the Viscotherm differential indicator. Also, the RPM can be monitored and checked by verifying the pulse count on the Viscotherm 400 card.
   iii. Install the Rotodiff: torque to specification, verify rotation plate position, and use a dial indicator to verify factory specifications for eccentricity. Shim accordingly if needed to adjust the eccentricity to factory specifications.

11. **Install rotating assembly on centrifuge frame**

   i. Wipe down main bearing machined surface with solvent. Use a honing stone to remove high spots on the machines surface.
   ii. Prepare the frame machined portion that accepts the pillow blocks; wipe down machined surface with solvent. Use a honing stone to remove high spots on the machines surface.
   iii. Rig the rotating assembly for lifting and lowering with slings and a factory spreader lifting device – making sure that the rotating assembly is precisely balanced horizontally. Lower the rotating assembly on the centrifuge frame.
   iv. Center the rotating assembly so there is proper clearance for the frame baffles.
   v. Perform a preliminary check of the main bearing alignment using double dial indicators, 180 degrees apart. Check for alignment at the 9 & 3 o'clock positions and at the 12 & six o'clock positions. All alignments must be within factory specifications.
   vi. Torque the main bearing fasteners to factory specifications using a torque multiplier.
   vii. Check the rotating assembly stem run-out for eccentricity using a dial indicator. Note and record the readings.

viii. Install the sheave and gear flange; Heat the components to 275 degrees making sure not to overheat the components. Install fasteners to factory torque specifications.
ix. Install the main drive belts
x. Verify alignment of the motor sheave to rotating sheave alignment. Adjust the motor base as necessary to align the sheaves.
xi. Install the Rotodiff as outlined previously
xii. Grease the internal scroll bearings. Purge the grease until all traces of air bubbles are eliminated.
xiii. Inspect the Rotodiff and belt guards. If cracked, bevel-grind the crack area and weld with a MIG welder. Paint the guards with safety yellow.
xiv. Flush the supply and return lines of the main bearing lubrication system.
xv. Terminate wires for the main bearing RTD
xvi. Run the back-drive on local (manual) to ensure that the hydraulic pump is primed. Prime the pump if necessary.

12. Test the centrifuge system.

In addition to testing the mechanical and electrical components as a centrifuge system, this portion of the scheduled PM work entails monitoring, evaluation, and adjustment of the centrifuge system components which is an Andritz specific, technical process. This process will produce de-watered municipal sludge to exacting specifications in: cake dryness, capture of solids and polymer dose.

i. Remove the electrical and mechanical lock-out tag-outs.
ii. Verify the centrifuge control panel powers up correctly, verify electrical components conditions:
    I. Verify that the PLC processor board does not have a fault condition
    II. Verify that there are LED indications of both the input and out modules of the PLC
    III. Press the "test light" button to acknowledge all indicator lamps work
    IV. Verify that the proportional amplifier card of the Viscotherm controller does not have fault indications
    V. Verify that there is bar, bowl rpm & differential indication of the Viscotherm controller
    VI. Verify that the main bearing temperature and vibration monitor are reading ambient temperature and zero in/sec respectively. If necessary, calibrate the instrument with a 4-20 milliamp signal generator to factory specifications.
    VII. Verify that there are no fault indications present of the PLC *(if so, troubleshoot the cause of the fault – see Service, diagnostic section)*
    VIII. Verify that there are no fault conditions on the main drive monitor screen – Eaton MP-3000. *(if so, troubleshoot the cause of the fault – see Service, diagnostic section).*
iii. Start and test the centrifuge system:
    I. Monitor and verify operation of the main drive bearing lubrication panel:

- Check flow to each bearing, adjust to factory specifications
- Purge air from the system by switching filters
- Check pressure of the oil flow to verify that it is within factory specification

II. Monitor and verify operation of the back-drive system.
- Verify that the Viscotherm controller displays the minimum differential as adjusted in the hydraulic pump replacement section.
- Check for unusual noises, vibration and leaks.

III. Monitor and verify the time to achieve the full speed of the bowl.
- The time to full speed is determined by the Voith fluid coupling ATF level. If necessary, shut down the centrifuge system and adjust the TF level accordingly to increase or decrease the time to full bowl speed.
- Monitor the main drive motor amperage and bearing temperature.

IV. Monitor the rotating assembly main bearing temperature and centrifuge vibration. Allow the unit to reach full operating temperature and begin vibration readings of the centrifuge frame and rotating assembly. These readings are then taken with flush water and then while sludge is fed into the centrifuge. Readings are taken with factory authorized vibration instruments:
- Observe and record horizontal readings of the frame at the centrifuge frame vibration switch, axially at the main drive bearing pillow block, horizontal and vertical readings of the main bearing pillow block. Panel vibration readings are also recorded.

V. In conjunction with DEP operations, the centrifuge is then fed polymer and sludge to begin dewatering operations of sludge.
- The polymer and sludge pump flows are monitored for proper flow and operation. If a polymer or sludge feed alarm is present during this portion of testing, then the centrifuge system is diagnosed for issues with wiring or component failure. If necessary, and as an aide to troubleshoot an alarm, the PLC program is monitored using PLC factory application software and a laptop computer plugged into the PLC.
- The Viscotherm controller is then monitored for: bowl speed, bar pressure and differential. Differential monitoring is simultaneously checked with bar pressure to ensure that the back-drive system is working correctly under automatic control. If necessary, there may have to be adjustments made with the: squash plate indicator, base mechanical speed of the hydraulic pump, electronic base speed of the analog 500 card, boost pressure and base speed. While the Viscotherm controller is in auto control, the 600 card is the adjusted for ramp up speed and base differential.
- The bar pressure/torque on automatic control is then adjusted to produce the driest cake possible while using the lowest amount of polymer and still have acceptable solids in the effluent stream. In

addition to this, adjustments in sludge flow and or polymer flow may have to be adjusted to achieve the desired product cake dryness and or effluent capture of solids.

iv. The centrifuge is released to DEP operations for operation. The scheduled preventative maintenance is completed with a full report and recorded readings. This is followed by completion of the DEP issued work orders entailing recorded work hours and an itemized list of parts installed.

II. Service and repair of the centrifuge system: Mechanical and Electrical

Mechanical repair and or corrective action of the centrifuge system: including the centrifuge rotating assembly, centrifuge frame and cover, back-drive system, lube oil panel system, Voith fluid coupling, pneumatic knife gate and cross conveyor

I. Diagnose, inspect, repair or replace defective mechanical components of the centrifuge system or component systems

II. Perform a visual inspection of the failed or failing component while in operation or if necessary, remove and inspect. If necessary, refer to a factory print to verify that critical dimensions are within tolerance. Replace or repair the component as necessary.

III. If applicable, repair the component or part that may include weld repairs but limited to machining. If machining is necessary, the component would have to be sent to our service center for machining.

Electrical repair of the centrifuge system: including centrifuge system control panel components, motor starter panel components, back-drive system electrical components, lube oil panel system electrical components, Voith BTS circuit, pneumatic knife gate electrical components and cross conveyor electrical components.

I. Monitor, diagnose, troubleshoot electrical and software issues of the centrifuge system using electrical prints. Replace components as required to repair the electrical issue. When required, make adjustments and or calibrate sub components as specified by individual manufacturers; e.g. Viscotherm 500, 600 cards. Red Lion frequency converters, Newport Digital Displays, Voith BTS circuit, etc.

- When required, monitor the PLC program while the centrifuge system is in operation to determine, on a program level, if there is a problem with field devices or the program itself. There are two PLC systems currently in use at NYC DEP centrifuge system installation: Siemens TI Soft Rockwell Automation RS Logix 5000. This requires the licensed program, the application software, a laptop

computer; factory wired serial port connectors and a computer port adapter. Competent knowledge of the PLC application software and basic programming knowledge is necessary for this portion of the electrical diagnostics. In addition and when necessary, downloading of the program software may be necessary if the loaded program was deleted.

III. Evaluation, diagnostics and remedy of process performance as it relates to the centrifuge system

1. **Evaluation to determine if the centrifuge system or sludge process conditions will need changes to produce require cake dryness and or solids capture in the effluent stream. In some instances, diagnose total upset in dewatering.**

i. Query DEP operations to determine if there is an upset in process condition: e.g. polymer solution makeup, stratification of sludge holding tanks that would allow supernatant to be fed into the centrifuge (low feed solids), etc.

ii. If process conditions are within normal plant parameters, determine if the centrifuge system has to be diagnosed:

   I. Monitor the Viscotherm controller to evaluate minimum differential and regulation of the back-drive.
      - Determine if there is a mechanical or electrical issue with the regulation of the back-drive while under automatic control
      - If electrical, determine if the problem is with the proportional amplifier or with the automatic card, 600.
      - Verify proper adjustment of the squash plate indicator and mechanical base differential of the hydraulic pump.

   II. If a mechanical issue is suspected with regulation of the back-drive, perform a factory pressure test of the hydraulic pump and or Rotodiff. Replace component/s if necessary

iii. Determine if there is a regulation issue with sludge feed and or polymer feed.

   I. Adjust the Siemens PID process controller for sludge feed and or polymer feed. If necessary, replace the controller

iv. Monitor process conditions after adjustments and or replacement of components to determine if cake dryness and or effluent solids capture are acceptable.

Rig rotating assembly onto flatbed truck from centrifuge room floor.
Rig rotating assembly off of flatbed truck onto centrifuge room floor.

SCHEDULE "B" - DRUG AND ALCOHOL POLICY

PREAMBLE

WHEREAS, [CONSTRUCTION MANAGER] ("Construction Manager"), for the construction project located at [PROJECT ADDRESS] ("Project") desires to provide for a safe, drug and alcohol-free work site for the Project;

WHEREAS, the parties have entered into a separate Project Labor Agreement for the Project and have agreed to negotiate in good faith a Project Drug & Alcohol Testing Policy;

WHEREAS, this Testing Policy is collectively negotiated between the Construction Manager and the New York City Building and Construction Trades Council ("Council") (the Construction Manager and BCTC are collectively referred to hereafter as the "Parties");

WHEREAS, the Parties each currently have respective drug and alcohol policies, including the Projects' Zero-Tolerance policy;

WHEREAS, the Parties desire to maximize project safety conditions for the Project personnel and public, as well as deter violations of the Parties' respective drug and alcohol policies;

NOW, THEREFORE, the Parties agree to this Policy as of the date hereof,

ARTICLE 1 - PARTIES

This Drug & Alcohol Testing Policy ("Policy") is hereby established by the Construction Manager and the Council, on behalf of itself and its affiliated local union members, and the signatory local unions on behalf of themselves and their members.

ARTICLE 2-GENERAL CONDITIONS

SECTION 2.1 - SUMMARY

In order to reinforce the Parties' respective drug and alcohol policies, including the Projects' zero tolerance policy regarding the prohibition of the use of drugs and alcohol, and to deter Project personnel from violating those policies, the Parties agree that all Project Personnel (defined later) will be required to submit to drug and/or alcohol testing randomly, post-accident, and for reasonable suspicion provided such testing is in accordance with applicable state and/or federal law, including the limitations in NYS Labor Law 201-d applicable to the lawful use of marijuana.

Any individual on site that violates this Policy is subject to disciplinary action, including, without limitation, loss of site access privileges.

SECTION 2.2 - REVOCATION OF PROJECT ACCESS PRIVILEGES

Any one of the following occurrences will result in the immediate revocation of a Project Personnel's project access privileges:

1. An individual is found selling or using drugs or alcohol, or otherwise is under the influence of drugs or alcohol, subject to the other terms of this Policy, on a Project Site;
2. An individual has been convicted under any criminal drug or alcohol statute for a violation occurring in the workplace within the past two years;
3. An individual who refuses to abide by the Projects' drug and alcohol policy, or refuses to submit to a test in accordance with this Policy;
4. An individual who switches, adulterates, or in any way tampers with a specimen required to be submitted in accordance with this Policy.

SECTION 2.3 - DEFINITIONS

Confirmed Positive Test: The presence of drugs, drug metabolites, or alcohol in a person's body that equals or exceeds the established cut off levels as defined in Exhibit 1. For drugs, the sample will have undergone Laboratory screening and confirmation testing and must have been verified as positive by a Medical Review Officer. A positive test result for alcohol obtained through Evidential Breath Testing is considered a Confirmed Positive Test.

Employee Assistance Program (EAP): An EAP is generally considered a workplace-based, confidential program designed to help employees deal effectively with a variety of personal problems, and, of relevance to this policy, substance abuse problems. The EAP promotes assessments and short-term counseling. An EAP shall also include any similar education or rehabilitation program provided by the Councilor its respective members. The Project Personnel that are required to participate in the EAP shall be responsible for the cost of their consultation with an EAP and/or participation in any education or rehabilitation program.

Evidential Breath Testing Device (EBT): A device that is used to measure alcohol in the breath and which meets National Highway Traffic Safety Administration's specifications for precision and accuracy.

Laboratory: A laboratory that is SAMHSA (Substance Abuse and Mental Health Services Administration) certified for the testing of drugs.

Medical Review Officer (MRO): A licensed physician responsible for receiving laboratory results generated by an employer's drug testing plan who has knowledge of substance abuse disorders and medical training to interpret and evaluate a donor's confirmed positive test result together with his/her medical history and all other relevant information.

Previous Worker: All individuals whose employment relationship with the contractor, company or organization no longer exists.

Project Site: The construction area for respective Project.

Reasonable Suspicion: When a qualified trade contractor, the Developer or Construction Manager as set forth in Section 3.7, reasonably believes that an individual has violated this Policy. Reasonable suspicion is based upon (1) specific, current, behavioral or performance indicators, (2) the possible manufacture, distribution, consumption or possession of unauthorized drugs, drug paraphernalia, or alcohol, or (3) documented investigation by an agency retained by, or otherwise independent from, the Developer or Construction

Manager.

SECTION 2.4 - INCLUDED SUBJECTS

This Policy shall cover all employees of the Owner, Construction Manager and Project trade contractors, their subcontractors and any other of their respective personnel at any level that are performing any activity at a Project Site, inclusive of managers, superintendents and supervisors, except as specifically excluded by Section 2.5 of this Policy (collectively and singularly, "Project Personnel").

SECTION 2.5 - EXCLUDED SUBJECTS

The following persons are not subject to the provisions of this Policy:

A. Employees and entities engaged in off-site manufacture, modifications, repair, maintenance, assembly, painting, handling or fabrication of components, materials, equipment or machinery;

B. Vendors and employees of vendors engaged on a Project Site in equipment testing, inspection, training, warranty work, or engaged in corrections of defective or nonconforming work, unless such employees are expressly included in the bargaining unit of a local signatory to this Agreement;

C. Employees engaged in ancillary work on a Project which is performed by third parties, such as electric utilities, gas utilities, telephone companies, and railroads, or any other work not constituting Project work;

D. Employees of any governmental authority (state, local or otherwise);

E. Employees and contractors engaged in work on the Project Site as part of due diligence or monitoring, which work is ancillary to Project work; and

F. Emergency responders.

SECTION 2.6 - PRESCRIPTION AND NON-PRESCRIPTION DRUGS

The use of prescription drugs not prescribed directly to Project Personnel is prohibited, including the use of drugs prescribed to a spouse or domestic partner. The use of non-prescription drugs that are sold outside the United States and that contain substances that are illegal or require a prescription in the United States are prohibited, unless prescribed by a licensed physician.

SECTION 2.7 - SEARCHES

In order for the Construction Manager to ensure the safety of Project Personnel and for the Construction Manager to protect its assets, the Construction Manager shall have the right upon good cause (such as reasonable suspicion of a violation of this Policy) to conduct reasonable searches for alcohol, drugs and related paraphernalia anywhere within the boundaries of a Project Site. A search may include any assets owned or leased by any Project Personnel that is on a Project Site, including without limitation, vehicles, lockers, gang boxes, desks and personal property brought onto a Project Site, but excluding personal body searches or physical contact with employees.

ARTICLE 3 - DRUG & ALCOHOL TESTING

SECTION 3.1 - COLLECTION PROCESS

As of the execution date of this PLA, Project Personnel may be required to submit urine samples ("Preliminary Drug Screening") for the purpose of detecting the presence of drugs as part of the random, post-accident or reasonable suspicion testing, in accordance with chain of custody protocols as established by Substance Abuse and Mental Health Services Administration (SAMHSA), utilizing an instant result test cup for Preliminary Drug Screenings, such testing is to be performed on-site by an independent service provider. The results from the instant result test cup will be considered preliminary. The sample will be sent to a SAMHSA certified testing laboratory for confirmation.

As of the date hereof, all Project Personnel will be required to submit to an Evidential Breath Test (EBT) for the purpose of detecting the presence of alcohol when submitting to random, post-accident or reasonable suspicion testing. Alcohol testing will not be conducted for pre-access testing.

SECTION 3.2 - NEGATIVE PRELIMINARY DRUG SCREENING

Project Personnel with a negative Preliminary Drug Screening will be considered conditionally accepted for Project site access, pending confirming laboratory results. Site access privileges will be revoked if the subsequent laboratory results determine that the sample has tested positive for drugs or that the sample has been adulterated.

SECTION 3.3 POSITIVE PRELIMINARY DRUG SCREENING

If the Preliminary Drug Screening indicates a positive result, the individual will not be allowed access to the Project Site. The sample will be sent to the certified laboratory for analysis and, if applicable, reviewed by the Medical Review Officer (MRO). If the laboratory confirmation results are also positive, the individual will be considered in violation of this Policy and their site access will be revoked for at least 30 days. If the laboratory confirmation results are negative, the Project Personnel's site access will not be revoked.

SECTION 3.4 CONFIRMED POSITIVE TEST RESULTS

A. POSITIVE DRUG TEST

A drug test is considered positive if the test results exceed the limits shown in Exhibit 1, which is attached hereto and incorporated herein by reference. The test will be confirmed through a second analysis process and reviewed by an MRO before results are reported. Project Personnel with confirmed positive drug test results will have their site access revoked. In case of a "false positive" result, any such Personnel shall be entitled to the reimbursement of any wages lost during the suspension caused by any such false positive result.

B. POSITIVE EBT

An EBT is considered positive if the test results exceed .04 BrAC, or as otherwise set forth in Exhibit 1. Project Personnel with a positive alcohol test result will be subject to the remedies set forth in Exhibit 1.

C. REINSTATEMENT OF SITE ACCESS PRIVILEGES

(a) Subject to section 3.4(C)(a) immediately below, if the site access of a Project Personnel has been revoked pursuant to this Policy, then any such person may request that their site

access be reinstated after 30 days, provided that all of the following conditions are met to the reasonable satisfaction of the Construction Manager. :

1. The individual has provided proof of wellness from an accredited rehabilitation facility or has provided proof that treatment isn't needed as attested to by a licensed health care provider specializing in the diagnosis and treatment of alcohol and drug abuse.
2. A current drug and alcohol test is obtained within three (3) days of the request for re-access to the site and proof of a negative test result has been received; and
3. The individual agrees to submit to multiple testing for two (2) full years from the date of gaining re-access to the project, the scheduling of which will be determined at the sole discretion of the Construction Manager. If all of these conditions have been met, the Construction Manager agrees that it will not unreasonably withhold their consent to any such request.

(b) Unlawful possession, concealment, use, purchase, sale, manufacture, dispensation or distribution of illegal drugs or un-prescribed controlled substances on the Project site will subject the Project Personnel Employee to immediate removal from the Project site and shall bar such Project Personnel Employee from returning for a minimum of three (3) months, which return shall, in any event, be subject to the reasonable approval by Construction Manager.

(c) All of the Parties agree that any such Project Personnel will only be entitled to any such reinstatement of site access privileges one time and that any subsequent violation of this Policy will result in the permanent termination of access to the Project Site.

SECTION 3.5 - RANDOM TESTING

A third-party provider designated by the Construction Manager will randomly select by an objective criteria a testing pool for random drug and/or alcohol testing from all Project Personnel with site access cards. Any individual selected for a random drug and/or alcohol test will be required to submit to an Evidential Breath Test (EBT) and/or drug test. Individuals may be tested more than once during any given time period. The Parties acknowledge and agree that an EBT may be required without a drug test and that a drug test may be required without an EBT, as solely determined by the Construction Manager.

If an individual is unable to attend the first scheduled random drug test as a result of being involved in a work-related task, such drug test will be rescheduled and will be completed at or before the conclusion of such employee's then current work shift. If the second drug test is missed for any reason, the incident will be reviewed by the Construction Manager, who shall have the right to terminate the site access privileges of any such Project Personnel until such time as that Project Personnel has complied with this Policy. If the individual refuses to take the test, their access privileges will be immediately terminated for cause.

SECTION 3.6 - POST ACCIDENT TESTING

After each work-related incident or injury requiring the services of a licensed health care provider, all Project Personnel involved with the incident will be required to submit to a drug and/or alcohol test immediately following the incident. In instances where emergency care is necessary, the drug and/or alcohol test shall be obtained by the care facility, if

possible, within 24 hours after treatment is rendered. If more than 48 hours have passed before an injury is reported and treated by a licensed health care provider, an alcohol test will not be required.

In addition, any Project Personnel involved in a non-injury related incident at a Project Site with damages at or in excess of $200 will be required to submit to a drug and/or alcohol test unless:

A. It is determined, after conducting an investigation and interviewing all employees involved and any witnesses, that the employee's performance can be completely discounted as a contributing factor to the incident; or
B. It is determined, after conducting an incident investigation and interviewing all employees and any witnesses that the incident was caused by inadequate equipment or system design, and/or premature failure of equipment or system components.

SECTION 3.7 - REASONABLE SUSPICION TESTING

All Project Personnel will be required to submit to a drug and/or alcohol test when there is reasonable suspicion the individual has violated this policy.

Reasonable suspicion includes, without limitation, the following:

A. Violent or irrational behavior;
B. Emotional or physical unsteadiness;
C. Sensory or motor-skill malfunctions;
D. Slurred speech;
E. The odor of alcohol or drugs on clothing or breath in conjunction with other indicators;
F. Possession of alcohol, unauthorized drugs or drug paraphernalia; or
G. Documented evidence of an independent investigation regarding Project Personnel's consumption of what is reasonably believed to be an alcoholic beverage or drugs in violation of the Project's policies and/or this Policy.

Reasonable suspicion testing may only be ordered by supervisory personnel that: (a) have been trained to recognize the above referenced factors; or (b) have received credible documentary evidence from an independent investigator that a Project Personnel has violated a drug and/or alcohol policy. It is agreed that any certified training program shall satisfy the training requirement.

SECTION 3.8 - PRIVACY CONSIDERATIONS

The Parties agree to use reasonable efforts to conduct any testing pursuant to this Policy in accordance with the privacy concerns of Project Personnel. To address these concerns, the Parties agree that:

1. The testing station(s) shall be screened off, or otherwise closed off from public view.
2. All documents and information regarding the testing, including test results, shall be maintained by the respective custodian(s) of record in accordance with

their respective privacy policies, which any Project Personnel shall be entitled to review upon timely request.

3. The Parties agree to make a good faith effort to resolve any other privacy concern of Project Personnel regarding this Policy, provided that any such concerns do not interfere with the purpose of this Policy.

ARTICLE 4 – GRIEVANCE

SECTION 4.1 - REPRESENTED WORKERS

Nothing in this Policy shall restrict a member of a signatory local union from filing a grievance in accordance with the member's collective bargaining agreement or a Project Labor Agreement, provided that the grievance shall be limited to whether the removal of a member for violation of this Policy was conducted in compliance with the terms and conditions set forth herein.

SECTION 4.2 - HOLD HARMLESS

The Construction Manager agrees to hold harmless and indemnify the Union/Council and its representatives from any liability that may be incurred as a result of the Company's Drug and Alcohol Policy to the extent caused by the negligence or intentional misconduct of the Construction Manager.

IN WITNESS WHEREOF the parties have agreed to this Policy as of _____, 20___.

FOR [CONSTRUCTION MANAGER]

By: _____

Name: [INSERT NAME]_____

Title: [INSERT TITLE]_____

FOR GREATER NEW YORK CITY BUILDING TRADES COUNCIL

By: _____

Name: Gary LaBarbera _____

Title: President

EXHIBIT 1

CLASS OF DRUGS TESTED AND THEIR RESPECTIVE CUT-OFF LIMITS

The cut-off limits established are those recommended by the U.S. Department of Health and Human Services in their mandatory Guidelines for Federal Workplace Drug Testing Programs.

Drug Class	Screening Cut-Off Limit (ng/ml)	Confirmation Cut-off Limit (ng/ml)
Amphetamines	1000	500
Benzoylecgonine (Cocaine Metabolite)	300	150
Cannabinoids (THC)	50	15
*Opiates	2000	10
Phencyclidine (PCP)	25	25

Confirmation screening is done by means of GC/MS analysis.

*The GC/MS confirmation for opiates will be for both codeine and morphine separately. If morphine is equal to or greater than 2,000ng/ml then the GC/MS confirmation analysis for 6- acetylmorphine (6-MAM) is at a cut-off level of 10ng/ml.

Alcohol Screening

All Project Personnel will be required to submit to an EBT under the random, post-accident, and reasonable suspicion test arenas, for the purpose of detecting presence of alcohol. If this test supports a positive result for presence of alcohol, the Project Personnel will be considered in violation of this Policy.

If the results of the EBT are:

1. Above 0.001 BrAC, but at or below 0.020 BrAC, a second test will be conducted within approximately 15 minutes.
    - If the second BrAC test is less than the first BrAC, the results will be deemed negative and the Project Personnel may return to work, if there are no other outstanding issues.
- If the second BrAC is increasing, but below 0.04 BrAC, the results will be deemed negative, but the Project Personnel will be sent home for the day and the Construction Manager shall be notified. If a Project Personnel is sent home two times within a six-month period pursuant to this Section I, then any such Project Personnel shall be deemed to have tested positive and will be subject to the applicable remedies set forth in Section 2 below.

2. Above 0.02 BrAC, but below 0.06 BrAC, a second test will be conducted after approximately 15 minutes.

- Notwithstanding anything set forth above to the contrary, a Project Personnel may elect to voluntarily go home for the day instead of taking a second test and the results will be deemed negative, provided that any such Project Personnel may not voluntarily go home more than once within a twelve month period.
- If the second BrAC test is at or below 0.02 BrAC, the results will be deemed negative and the Project Personnel may return to work if there are no other outstanding issues.
- If the second BrAC test is above 0.020, but below 0.06, the results will be deemed positive, the Project Personnel will be sent home for the day and their site access will be revoked for at least five [5] calendar days and until such time as the Project Personnel has been evaluated by an EAP professional skilled in substance abuse and confirmed fit for duty.
- Any Project Personnel who is deemed positive two times within two years pursuant to this Section 2 will have their site access privileges terminated and will be entitled to the limited relief set forth in Section 3 .4(c) of the Policy.

3. At or above .06 BrAC, the Project Personnel will have their site access privileges terminated, after which they will be entitled to the limited relief set forth in Section 3.4(C) of the Policy.

CITY OF NEW YORK

DEPARTMENT OF DESIGN AND CONSTRUCTION

INFORMATION FOR BIDDERS

October 2025

THIS PAGE INTENTIONALLY LEFT BLANK

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION

INFORMATION FOR BIDDERS

TABLE OF CONTENTS

1.	Description and Location of Work	1
2.	Time and Place for Receipt of Bids	1
3.	Definitions	1
4.	Invitation For Bids and Contract Documents	1
5.	Pre-Bid Conference	1
6.	Agency Contact	1
7.	Bidder's Oath	1
8.	Examination and Viewing of Site, Consideration of Other Sources of Information and Changed Conditions	2
9.	Examination of Proposed Contract	2
10.	Form of Bid	2
11.	Irrevocability of Bid	2
12.	Acknowledgment of Amendments	3
13.	Bid Samples and Descriptive Literature	3
14.	Proprietary Information/Trade Secrets	3
15.	Pre-Opening Modification or Withdrawal of Bids	3
16.	Bid Evaluation and Award	3
17.	Late Bids, Late Withdrawals and Late Modifications	3
18.	Withdrawal of Bids.	3
19.	Mistake in Bids	4
20.	Low Tie Bids	4
21.	Rejection of Bids	4
22.	Right to Appeal Determinations of Non-Responsiveness or Non-Responsibility and Right to Protest Solicitations and Award	5
23.	Affirmative Action and Equal Employment Opportunity	5
25.	Complaints About the Bid Process	6
26.	Bid, Performance and Payment Security	6
27.	Failure to Execute Contract	7
28.	Bidder Responsibilities and Qualifications	7
29.	Employment Report	8
30.	Labor Law Requirements	8
31.	Insurance	8
32.	Lump Sum Contracts	8
33.	Unit Price Contracts	9

34. Excise Tax 9
35. Licenses and Permits 9
36. Multiple Prime Contractors 9
37. Locally Based Enterprise Requirements (LBE) 9
38. Bid Submission Requirements 11
39. Comptroller's Certificate 11
40. Procurement Policy Board Rules 11
41. DDC Safety Requirements 11

1. Description and Location of Work

The description and location of the work for which bids are requested are specified in the PASSPort RFx field "Description".

2. Time and Place for Receipt of Bids

Sealed bids shall be received on or before the date and hour specified in the PASSPort RFx, at which time they will be publicly opened and read aloud in the presence of the Commissioner or the Commissioner's or her representative, and any bidders who may desire to be present.

3. Definitions

The definitions set forth in the Procurement Policy Board Rules shall apply to this Invitation For Bids.

4. Invitation For Bids and Contract Documents

(A) Except for titles, sub-titles, headings, running headlines, tables of contents and indices (all of which are printed herein merely for convenience) the following, except for such portions thereof as may be specifically excluded, shall be deemed to be part of the Contract and the Invitation for Bids.

(1) All provisions required by law to be inserted in this Contract, whether actually inserted or not

(2) The Contract Drawings and Specifications

(3) The General Conditions, the General Requirements and the Special Conditions, if any

(4) The Contract

(5) The Information for Bidders; Request for Proposals; Notice of Solicitation and Proposal For Bids; Bid or Proposal, and the Bid Booklet

(6) The Budget Director's Certificate; all Addenda issued prior to the receipt of the bids; the Notice of Award; Performance and Payment Bonds, if required; and the Notice to Proceed with the Work.

(B) For particulars as to this procurement, including quantity and quality of the purchase, extent of the work or labor to be performed, delivery and performance schedule, and any other special instructions, prospective bidders are referred to the Invitation For Bids Documents. A copy of such documents can be obtained in the PASSPort RFx.

5. Pre-Bid Conference

A pre-bid conference shall be held as set forth in the PASSPort RFx. Nothing stated at the pre-bid conference shall change the terms or conditions of the Invitation For Bids Documents, unless a change is made by written amendment as provided in Section 9 below. Failure to attend a mandatory pre-bid conference shall constitute grounds for the rejection of the bid.

6. Agency Contact

Any questions or correspondence relating to this bid solicitation shall be addressed to the Agency Contact person specified in the PASSPort RFx.

7. Bidder's Oath

(A) The bid shall be properly signed by an authorized representative of the bidder and the bid shall be verified by the written oath of the authorized representative who signed the bid, that the several matters stated and information furnished therein are in all aspects true.

(B) A materially false statement willfully or fraudulently made in connection with the bid or any of the forms completed and submitted with the bid may result in the termination of any Contract between the City and the Bidder. As a result, the Bidder may be barred from participating in future City contracts as well as be subject to possible criminal prosecution.

8. Examination and Viewing of Site, Consideration of Other Sources of Information and Changed Conditions

(A) Pre-Bidding (Investigation) Viewing of Site - Bidders must carefully view and examine the site of the proposed work, as well as its adjacent area, and seek other usual sources of information, for they will be conclusively presumed to have full knowledge of any and all conditions on, about or above the site relating to or affecting in any way the performance of the work to be done under the Contract which were or should have been indicated to a reasonably prudent bidder. To arrange a date for visiting the work site, bidders are to contact the Agency Contact person specified in The PASSPort RFx.

(B) Should the contractor encounter during the progress of the work subsurface conditions at the site materially differing from any shown on the Contract Drawings or indicated in the Specifications or such subsurface conditions as could not reasonably have been anticipated by the contractor and were not anticipated by the City, which conditions will materially affect the cost of the work to be done under the Contract, the attention of the Commissioner must be called immediately to such conditions before they are disturbed. The Commissioner shall thereupon promptly investigate the conditions. If the Commissioner finds that they do so materially differ, or that they could not reasonably have been anticipated by the contractor and were not anticipated by the City, the Contract may be modified with the Commissioner's written approval.

9. Examination of Proposed Contract

(A) Request for Interpretation or Correction: Prospective bidders must examine the Contract Documents carefully and before bidding must request the Commissioner in writing for an interpretation or correction of every patent ambiguity, inconsistency or error therein which should have been discovered by a reasonably prudent bidder. Such interpretation or correction, as well as any additional contract provisions the Commissioner may decide to include, will be issued in writing by the Commissioner as an addendum to the Contract, which will be transmitted to each person recorded as having received a copy of the Contract Documents from the Department. Transmission of such addendum will be by mail, e-mail, facsimile or hand delivery. Such addendum will also be posted at the place where the Contract Documents are available for the inspection of prospective bidders. Upon transmission as provided for herein, such addendum shall become a part of the Contract Documents, and binding on all bidders, whether or not actual notice of such addendum is shown.

(B) Only Commissioner's Interpretation or Correction Binding: Only the written interpretation or correction so given by the Commissioner shall be binding, and prospective bidders are warned that no other officer, agent or employee of the City is authorized to give information concerning, or to explain or interpret, the Contract.

(C) Documents given to a subcontractor for the purpose of soliciting the subcontractor's bid shall include either a copy of the bid cover sheet or a separate information sheet setting forth the project name, the Contract number (if available), the contracting agency and the Project's location.

10. Form of Bid

Each bid must be submitted upon the prescribed form and must contain: a) the name, residence and place of business of the person or persons making the same; b) the names of all persons interested therein, and if no other person is so interested, such fact must be distinctly stated; c) a statement to the effect that it is made without any connection with any other person making a bid for the same purpose and that it is in all respects fair and without collusion or fraud; d) a statement that no Council member or other officer or employee or person whose salary is payable in whole or part from the City Treasury is directly or indirectly interested therein or in the supplies, materials or equipment and work or labor to which it relates, or in any portion of the profits thereof; e) a statement that the bidder is not in arrears to the City or to any agency upon a debt or contract or taxes, and is not a defaulter as surety or otherwise upon any obligation to the City to any agency thereof, except as set forth in the bid.

11. Irrevocability of Bid

The prices set forth in the bid cannot be revoked and shall be effective until the award of the Contract, unless the bid is withdrawn as provided for in Sections 15 and 18 below.

12. Acknowledgment of Amendments

The receipt of any amendment to the Contract Documents shall be acknowledged by the bidder in its bid submission.

13. Bid Samples and Descriptive Literature

Bid samples and descriptive literature shall not be submitted by the bidder, unless expressly requested elsewhere in the Contract or Contract Documents. Any unsolicited bid samples or descriptive literature which are submitted shall not be examined or tested and shall not be deemed to vary any of the provisions of this Contract.

14. Proprietary Information/Trade Secrets

(A) The bidder shall identify those portions of the bid which it deems to be confidential, proprietary information or trade secrets, and provide justification why such materials shall not be disclosed by the City. All such materials shall be clearly indicated by stamping the pages on which such information appears, at the top and bottom thereof with the word "Confidential". Such materials stamped "Confidential" must be easily separable from the non-confidential sections of the bid.

(B) All such materials so indicated shall be reviewed by the Agency and any decision not to honor a request for confidentiality shall be communicated in writing to the bidder. For those bids which are unsuccessful, all such confidential materials shall be returned to the bidder. Prices, makes and model or catalog numbers of the items offered, deliveries, and terms of payment shall be publicly available after bid opening, regardless of any designation of confidentiality made by the bidder.

15. Pre-Opening Modification or Withdrawal of Bids

Bids may be modified or withdrawn by written notice received in the office designated in the PASSPort RFx, before the time and date set for the bid opening. If a bid is withdrawn in accordance with this Section, the bid security, if any, shall be returned to the bidder.

16. Bid Evaluation and Award

In accordance with the New York City Charter, the Procurement Policy Board Rules and the terms and conditions of this Invitation For Bids, this Contract shall be awarded, if at all, to the responsible bidder whose bid meets the requirements and evaluation criteria set forth in the Invitation For Bids, and whose bid price is either the most favorable bid price or, if the Invitation For Bids so states, the most favorable evaluated bid price. A bid may not be evaluated for any requirement or criterion that is not disclosed in the Invitation For Bids.

Restriction: No negotiations with any bidder shall be allowed to take place except under the circumstances and in the manner set forth in Section 21. Nothing in this Section shall be deemed to permit a contract award to a bidder submitting a higher quality item than that designated in the Invitation For Bids, if that bid is not also the most favorable bid.

17. Late Bids, Late Withdrawals and Late Modifications

Any bid received at the place designated in the solicitation after the time and date set for receipt of bids is late and shall not be considered. Any request for withdrawal or modification received at the place designated in the solicitation after the time and date set for receipt of bids is late and shall not be considered. The exception to this provision is that a late modification of a successful bid that makes the bid terms more favorable to the City shall be considered at any time it is received.

18. Withdrawal of Bids.

Except as provided for in Section 15, above, a bidder may not withdraw its bid before the expiration of forty-five (45) days after the date of the opening of bids; thereafter, a bidder may withdraw its bid only in writing and in advance of an actual award. If within sixty (60) days after the execution of the Contract, the Commissioner fails to fix the date for commencement of work by written notice to the bidder, the bidder at the bidder's option, may ask to be relieved of the bidder's obligation to perform the work called for by written notice to the Commissioner. If such notice is given to the Commissioner, and the request to withdraw is granted, the bidder waives all claims in connection with this Contract.

19. Mistake in Bids

(A) Mistake Discovered Before Bid Opening: A bidder may correct mistakes discovered before the time and date set for bid opening by withdrawing or correcting the bid as provided in Section 15 above.

(B) Mistakes Discovered Before Award

(1) In accordance with General Municipal Law (Section 103, subdivision 11), where a unilateral error or mistake is discovered in a bid, such bid may be withdrawn upon written approval of the Agency Chief Contracting Officer if the following conditions are met:

(a) The mistake is known or made known to the agency prior to the awarding of the Contract or within 3 days after the opening of the bid, whichever period is shorter; and

(b) The price bid was based upon an error of such magnitude that enforcement would be unconscionable; and

(c) The bid was submitted in good faith and the bidder submits credible evidence that the mistake was a clerical error as opposed to a judgment error; and

(d) The error in the bid is actually due to an unintentional and substantial arithmetic error or an unintentional omission of a substantial quantity of work, labor, material or services made directly in the compilation of the bid, which unintentional arithmetic error or unintentional omission can be clearly shown by objective evidence drawn from inspection of the original work paper, documents, or materials used in the preparation of the bid sought to be withdrawn; and

(e) It is possible to place the agency in the same position as existed prior to the bid.

(2) Unless otherwise required by law, the sole remedy for a bid mistake in accordance with this Article shall be withdrawal of the bid, and the return of the bid bond or other security, if any, to the bidder. Thereafter, the agency may, in its discretion, award the Contract to the next lowest bidder or rebid the Contract. Any amendment to or reformation of a bid or a Contract to rectify such an error or mistake therein is strictly prohibited.

(3) If the mistake and the intended correct bid are clearly evident on the face of the bid document, the bid shall be corrected to the intended correct bid and may not be withdrawn. Examples of mistakes that may be corrected are typographical errors, errors in extending unit prices, transposition errors and arithmetical errors.

20. Low Tie Bids

(A) When two or more low responsive bids from responsible bidders are identical in price, meeting all the requirements and criteria set forth in the Invitation For Bids, the Agency Chief Contracting Officer will break the tie in the following manner and order of priority:

(1) Award to a certified New York City small, minority or woman-owned business entity bidder;

(2) Award to a New York City bidder;

(3) Award to a certified New York State small, minority or woman-owned business bidder;

(4) Award to a New York State bidder.

(B) If two or more bidders still remain equally eligible after application of paragraph (A) above, award shall be made by a drawing by lot limited to those bidders. The bidders involved shall be invited to attend the drawing. A witness shall be present to verify the drawing and shall certify the results on the bid tabulation sheet.

21. Rejection of Bids

(A) Rejection of Individual Bids: The Agency may reject a bid if:

(1) The bidder fails to furnish any of the information required pursuant to Section 24 or 28 hereof; or if

(2) The bidder is determined to be not responsible pursuant to the Procurement Policy Board Rules; or if

(3) The bid is determined to be non-responsive pursuant to the Procurement Policy Board Rules; or if

(4) The bid, in the opinion of the Agency Chief Contracting Officer, contains unbalanced bid prices and is thus non-responsive, unless the bidder can show that the prices are not unbalanced for the probable required quantity of items, or if the imbalance is corrected pursuant to Section 15.

(B) Rejection of All Bids: The Agency, upon written approval by the Agency Chief Contracting Officer, may reject all bids and may elect to resolicit bids if in its sole opinion it shall deem it in the best interest of the City so to do.

(C) Rejection of All Bids and Negotiation With All Responsible Bidders: The Agency Head may determine that it is appropriate to cancel the Invitation For Bids after bid opening and before award and to complete the acquisition by negotiation. This determination shall be based on one of the following reasons:

(1) All otherwise acceptable bids received are at unreasonable prices, or only one bid is received and the Agency Chief Contracting Officer cannot determine the reasonableness of the bid price, or no responsive bid has been received from a responsible bidder; or

(2) In the judgment of the Agency Chief Contracting Officer, the bids were not independently arrived at in open competition, were collusive, or were submitted in bad faith.

(B) When the Agency has determined that the Invitation for Bids is to be canceled and that use of negotiation is appropriate to complete the acquisition, the contracting officer may negotiate and award the Contract without issuing a new solicitation, subject to the following conditions:

(1) prior notice of the intention to negotiate and a reasonable opportunity to negotiate have been given by the contracting officer to each responsible bidder that submitted a bid in response to the Invitation for Bids;

(2) the negotiated price is the lowest negotiated price offered by a responsible bidder; and

(3) the negotiated price is lower than the lowest rejected bid price of a responsible bidder that submitted a bid in response to the Invitation for Bids.

22. Right to Appeal Determinations of Non-Responsiveness or Non-Responsibility and Right to Protest Solicitations and Award

The bidder has the right to appeal a determination of non-responsiveness or non-responsibility and has the right to protest a solicitation and award. For further information concerning these rights, the bidder is directed to the Procurement Policy Board Rules.

23. Affirmative Action and Equal Employment Opportunity

This Invitation For Bids is subject to applicable provisions of Federal, State and Local Laws and executive orders requiring affirmative action and equal employment opportunity.

24. PASSPort COMPLIANCE

All vendors that intend to do business with the City of New York must complete a disclosure process in order to be considered for a contract. This disclosure process was formerly completed using Vendor Information Exchange System (VENDEX) paper-based forms. The City of New York has moved collection of vendor disclosure information online. In early August 2017, the New York City Mayor's Office of Contract Services (MOCS) launched the Procurement and Sourcing Solutions Portal (PASSPort), a new online procurement system that replaced the paper-VENDEX process. In anticipation of awards, all bidders must create online accounts in the new PASSPort system, and file all disclosure information using PASSPort. Paper submissions, including certifications of no changes to existing VENDEX packages, will not be accepted in lieu of complete online filings using PASSPort.

All vendors that intend to do business with the City, but specifically those that fall into any of the following

categories, are required to enroll:

- Have a pending award with a City Agency; or
- Hold a current contract with a City Agency and have either an expiring VENDEX or expiring Certificate of No Change.

The Department of Design and Construction (DDC) and MOCS hereby notifies all proposers that the PASSPort system is available, and that disclosure filing completion is required prior to any award through this competitive bid.

To enroll in PASSPort and to access the PASSPort website (including online training), please visit www.nyc.gov/passport. Contact MOCS at passport@mocs.nyc.gov for additional information and technical support.

25. Complaints About the Bid Process

The New York City Comptroller is charged with the audit of contracts in New York City. Any vendor who believes that there has been unfairness, favoritism or impropriety in the bid process should inform the Comptroller, Office of Contract Administration, One Centre Street, Room 835, New York, New York; telephone number (212)669-2323.

26. Bid, Performance and Payment Security

(A) Bid Security: Each bid must be accompanied by bid security in an amount and type specified in the PASSPort RFx questionnaire. The bid security shall assure the City of New York of the adherence of the bidder to its proposal, the execution of the Contract, and the furnishing of Performance and Payment Bonds by the bidder, if required in the PASSPort RFx. Bid security shall be returned to the bidder as follows:

(1) Within ten (10) days after the bid opening, the Comptroller will be notified to return the deposits of all but the three (3) lowest bidders. Within five (5) days after the award, the Comptroller will be notified to return the deposits of the remaining two unsuccessful bidders.

(2) Within five (5) days after the execution of the Contract and acceptance of the Contractor's bonds, the Comptroller will be notified to return the bid security of the successful bidder or, if performance and payment bonds are not required, only after the sum retained under Article 21 of the Contract equals the amount of the bid security.

(3) Where all bids are rejected, the Comptroller will be notified to return the deposit of the three (3) lowest bidders at the time of rejection.

(B) Performance and Payment Security: Performance and Payment Security must be provided in an amount and type specified in the PASSPort RFx. The performance and payment security shall be delivered by the contractor prior to or at the time of execution of the Contract. If a contractor fails to deliver the required performance and payment security, its bid security shall be enforced, and an award of Contract may be made to the next lowest responsible and responsive bidder, or the contract may be rebid.

(C) Acceptable Types of Security: Acceptable types of security for bids, performance, and payment shall be limited to the following:

(1) a one-time bond in a form satisfactory to the City;

(2) a bank certified check or money order;

(3) obligations of the City of New York; or

(4) other financial instruments as determined by the Office of Construction in consultation with the Comptroller.

Whenever the successful bidder deposits obligations of the City of New York as performance and payment security, the Comptroller may sell and use the proceeds thereof for any purpose for which the principal or surety on such bond would be liable under the terms of the Contract. If the money is deposited with the Comptroller, the successful bidder shall not be entitled to receive interest on such money from the City.

(D) Form of Bonds: Security provided in the form of bonds must be prepared on the form of bonds authorized by the City of New York. Forms for bid, performance, and payment bonds are included in the Invitation for Bids Documents. Such bonds must have as surety thereunder such surety company or companies as are: (1) approved by the City of New York; (2) authorized to do business in the State of New York, and (3) approved by the Department of the Treasury of the United States. Premiums for any required bonds must be included in the base bid.

The bidder is advised that submission of a bid bond where the surety on such bond fails to meet the criteria set forth herein, shall result in the rejection of the bid as non-responsive.

The Department of the Treasury of the United States advises that information concerning approved surety companies may be obtained as follows: (1) from the Government Printing Office at 215-364-6465; (2) through the Internet at https://www.fiscal.treasury.gov/surety-bonds/.

(E) Power of Attorney: Attorneys in fact who sign bid, performance, or payment bonds must file with each bond a certified copy of their power of attorney to sign said bonds.

27. Failure to Execute Contract

In the event of failure of the successful bidder to execute the Contract and furnish the required security within ten (10) days after notice of the award of the Contract, the deposit of the successful bidder or so much thereof as shall be applicable to the amount of the award made shall be retained by the City, and the successful bidder shall be liable for and hereby agrees to pay on demand the difference between the price bid and the price for which such Contract shall be subsequently awarded, including the cost of any required reletting and less the amount of such deposit. No plea of mistake in such accepted bid shall be available to the bidder for the recovery of the deposit or as a defense to any action based upon such accepted bid. Further, should the bidder's failure to comply with this Section cause any funding agency, body or group (Federal, State, City, Public, Private, etc.) to terminate, cancel or reduce the funding on this project, the bidder in such event shall be liable also to the City for the amount of actual funding withdrawn by such agency on this project, less the amount of the forfeited deposit.

28. Bidder Responsibilities and Qualifications

(A) Bidders must include with their bids all information necessary for a determination of bidder responsibility, as set forth in the Specifications.

(B) The Agency may require any bidder or prospective bidder to furnish all books of account, records, vouchers, statements or other information concerning the bidder's financial status for examination as may be required by the Agency to ascertain the bidder's responsibility and capability to perform the Contract. If required, a bidder must also submit a sworn statement setting forth such information as the Agency may require concerning present and proposed plant and equipment, the personnel and qualifications of the bidder’s working organizations, prior experience and performance record.

(C) Oral Examination on Qualifications: In addition thereto, and when directed by the Agency, the bidder, or a responsible officer, agent or employee of the bidder, must submit to an oral examination to be conducted by the Agency in relation to the bidder’s proposed tentative plan and schedule of operations, and such other matters as the Agency may deem necessary in order to determine the bidder's ability and responsibility to perform the work in accordance with the Contract. Each person so examined must sign and verify a stenographic transcript of such examination noting thereon such corrections as such person may desire to make.

(D) If the bidder fails or refuses to supply any of the documents or information set forth in paragraph (B) hereof or fails to comply with any of the requirements thereof, the Agency may reject the bid.

29. Employment Report

In accordance with Executive Order No. 50 (1980) as modified by Executive Order 108 (1986), the filing of a completed Employment Report (ER) is a requirement of doing business with the City of New York for construction contractors with contracts of $1,000,000 or more and subcontractors with construction subcontracts of $750,000 or more. The required forms and information are included in the PASSPort Vendor Profile.

30. Labor Law Requirements

(A) General: The successful bidder will be required to comply strictly with all Federal, State and local labor laws and regulations.

(B) New York State Labor Law: This Contract is subject to New York State Labor Law Section 220, which requires that construction workers on the site be paid prevailing wages and supplements. The Contractor is reminded that all wage provisions of this Contract will be enforced strictly and failure to comply will be considered when evaluating performance. Noncompliance may result in the contractor being debarred by the City from future contracts. Complaints filed with the Comptroller may result in decisions which may debar a contractor from bidding contracts with any state governmental entity and other political subdivisions.

(C) Records: The Contractor is expected to submit accurate payroll reports and other required documents and verify attendance and job classifications being utilized in compliance with the law, Contract provisions and agency procedures.

31. Insurance

(A) Bidders are advised that the insurance requirements contained herein are regarded as material terms of the Contract. As required by Article 22 of the Contract, the contractor must effect and maintain with companies licensed and authorized to do business in the State of New York, the types of insurance set forth therein, when required by and in the amounts set forth in Schedule A of the General Conditions. Such required insurance must be provided from the date the contractor is ordered to commence work and up to the date of final acceptance of all required work.

(B) The contractor must, within ten days of receipt of the notice of award, submit the following insurance documentation: (a) original certificate of insurance for general liability in the amount required by Schedule A of the General Conditions, and (b) original certificates of insurance or other proof of coverage for workers' compensation and disability benefits, as required by Section 57 of the New York State Workers' Compensation Law and Section 220 of the Disability Benefits Law.

32. Lump Sum Contracts

(A) Comparison of Bids: Bids on Lump Sum Contracts will be compared on the basis of the lump sum price bid, adjusted for alternate prices bid, if any.

(B) Lump Sum Bids for "General Construction Work" which include excavation shall include all necessary excavation work defined in the Specifications as being included in the lump sum bid. The bidder shall also bid a unit price for the additional cost of excavating material which is defined in the Specifications as excavation for which additional payment will be made. The total estimated additional cost of removing such material will be taken as the quantity set forth in the Engineer's Estimate multiplied by the unit price bid. This total estimated cost of additional excavation shall be added to the lump sum bid for the General Construction Work for the purpose of comparing bids to determine the low bidder.

(C) Variations from Engineer's Estimate: The Engineer's Estimate of the quantity of excavation for which additional payment will be made is approximate only and is given solely to be used as a uniform basis for the comparison of bids and such estimate is not to be considered as part of this contract. The quantities actually required to complete the contract work may be more or less than the quantities in the Engineer's Estimate and, if so, no action for damages or for loss of profits shall accrue to the contractor by reason thereof.

33. Unit Price Contracts

(A) Comparison of Bids: Bids on Unit Price Contracts will be compared on the basis of a total estimated price, arrived at by taking the sum of the estimated quantities of such items, in accordance with the Engineer's Estimate of Quantities set forth in the Bid Schedule, multiplied by the corresponding unit prices, and including any lump sum bids on individual items.

(B) Variations from Engineer's Estimate: Bidders are warned that the Engineer's Estimate of Quantities on the various items of work and materials is approximate only, given solely to be used as a uniform basis for the comparison of bids, and is not be considered part of this contract. The quantities actually required to complete the contract work may be less or more than so estimated, and if so, no action for damages or for loss of profits shall accrue to the contractor by reason thereof.

(C) Overruns: The terms and conditions applicable to overruns of unit price items are set forth in Article 26 of the Contract.

34. Excise Tax

Bidders are referred to the Specifications for information on Federal Excise Tax exemptions.

35. Licenses and Permits

The successful bidder will be required to obtain all necessary licenses and permits necessary to perform the work.

36. Multiple Prime Contractors

If more than one prime contractor will be involved on this project, all contractors are required to examine the Invitation for Bid packages for all other parts of the project.

37. Locally Based Enterprise Requirements (LBE)

This Contract is subject to the requirements of Administrative Code, Section 6-108.1, and the regulations promulgated thereunder. No construction contract will be awarded unless and until these requirements have been complied with in their entirety. The bidder is advised of the provisions set forth below, as well as the provisions with respect to the Locally Based Enterprise Program contained in Article 67 of the Contract. The contractor is advised that:

(A) If any portion of the Contract is subcontracted, not less than ten percent of the total dollar amount of the contract shall be awarded to locally based enterprises ("LBEs"); except, where less than ten percent of the total dollar amount of the Contract is subcontracted, such lesser percentage shall be so awarded.

(B) No contractor shall require performance and payment bonds from LBE subcontractors.

(C) No Contract shall be awarded unless the contractor first identifies in its bid:

(1) the percentage, dollar amount and type of work to be subcontracted; and

(2) the percentage, dollar amount and type of work to be subcontracted to LBEs.

(D) Within ten calendar days after notification of low bid, the apparent low bidder shall submit an "LBE Participation Schedule" to the contracting agency. If such schedule does not identify sufficient LBE subcontractors to meet the requirements of Administrative Code Section 6-108.1, the apparent low bidder shall submit documentation of its good faith efforts to meet such requirements.

(1) The "LBE Participation Schedule" shall include:

(a) the name and address of each LBE that will be given a subcontract,

(b) the percentage, dollar amount and type of work to be subcontracted to the LBE, and

(c) the dates when the LBE subcontract work will commence and end.

(2) The following documents shall be attached to the "LBE Participation Schedule":

(a) verification letters from each subcontractor listed in the "LBE Participation Schedule" stating that the LBE will enter into a formal agreement for work,

(b) certification documents of any proposed LBE subcontractor which is not on the LBE certified list, and

(c) copies of the certification letter of any proposed subcontractor which is an LBE.

(3) Documentation of good faith efforts to achieve the required LBE percentage shall include as appropriate but not limited to the following:

(a) attendance at prebid meetings, when scheduled by the agency, to advise bidders of contract requirements;

(b) advertisement where appropriate in general circulation media, trade association publications and small business media of the specific subcontracts that would be at least equal to the percentage goal for LBE utilization specified by the contractor;

(c) written notification to association of small, minority and women contractors soliciting specific subcontractors;

(d) written notification by certified mail to LBE firms that their interest in the contract is solicited for specific work items and their estimated values;

(e) demonstration of efforts made to select portions of the work for performance by LBE firms in order to increase the likelihood of achieving the stated goal;

(f) documented efforts to negotiate with LBE firms for specific subcontracts, including at a minimum:

(i) The names, address and telephone numbers of LBE firms that are contacted;

(ii) A description of the information provided to LBE firms regarding the plans and specifications for portions of the work to be performed;

(iii) Documentation showing that no reasonable price can be obtained from LBE firms;

(iv) A statement of why agreements with LBE firms were not reached;

(g) a statement of the reason for rejecting any LBE firm which the contractor deemed to be unqualified; and

(h) documentation of efforts made to assist the LBE firms contacted that needed assistance in obtaining required insurance.

(E) Unless otherwise waived by the Commissioner with the approval of the Office of Economic and Financial Opportunity, failure of a proposed contractor to provide the information required by paragraphs (C) and (D) above may render the bid non-responsive and the Contract may not be awarded to the bidder. If the contractor states that it will subcontract a specific portion of the work, but can demonstrate despite good faith efforts it cannot achieve its required LBE percentage for subcontracted work until after award of Contract, the Contract may be awarded, subject to a letter of compliance from the contractor stating that it will comply with Administrative Code Section 6-108.1 and subject to approval by the Commissioner. If the contractor has not met its required LBE percentage prior to award, the contractor shall demonstrate that a good faith effort has been made subsequent to award to obtain LBEs on each subcontract until its meets the required percentage.

(F) When a bidder indicates prior to award that no work will be subcontracted, no work may be subcontracted without the prior written approval of the Commissioner, which shall be granted only if the contractor in good faith seeks LBE subcontractors at least six weeks prior to the start of work.

(G) The contractor may not substitute or change any LBE which was identified prior to award of the contract without the written permission of the Commissioner. The contractor shall make a written application to the Commissioner for permission to make such substitution or change, explaining why the contractor needs to change its LBE subcontractor and how the contractor will meet its LBE subcontracting requirement. Copies of such application must be served on the originally identified LBE by certified mail return receipt requested, as well as the proposed substitute LBE. The Commissioner shall determine whether or not to grant the contractor's request for substitution.

38. Bid Submission Requirements

The Bid Submission Requirements are set forth in the PASSPort RFx.

39. Comptroller's Certificate

This Contract shall not be binding or of any force unless it is registered by the Comptroller in accordance with Section 328 of the City Charter and the Procurement Policy Board Rules. This Contract shall continue in force only after annual appropriation of funds by the City of New York and certification as hereinabove set forth.

40. Procurement Policy Board Rules

This Invitation For Bids is subject to the Rules of the Procurement Policy Board of the City of New York. In the event of a conflict between said Rules and a provision of this Invitation For Bids, the Rules shall take precedence.

41. DDC Safety Requirements

The DDC Safety Requirements apply to the work to be performed pursuant to the Contract. The DDC Safety Requirements are set forth on the following pages.

THIS PAGE INTENTIONALLY LEFT BLANK

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
SAFETY REQUIREMENTS FOR CONSTRUCTION CONTRACTS

January 2020

THE DDC SAFETY REQUIREMENTS FOR CONSTRUCTION CONTRACTS INCLUDE THE FOLLOWING SECTIONS:

I. POLICY ON SITE SAFETY

II. PURPOSE

III. DEFINITIONS

IV. RESPONSIBILITIES

V. SAFETY QUESTIONNAIRE

VI. SITE SAFETY PLAN

VII. KICK-OFF/PRE-CONSTRUCTION MEETINGS AND SAFETY REVIEW

VIII. EVALUATION DURING WORK IN PROGRESS

IX. SAFETY PERFORMANCE EVALUATION

I. POLICY ON SITE SAFETY

The City of New York Department of Design and Construction (DDC) is committed to a policy of injury and illness prevention and risk management for construction work that will ensure the safety and health of the workers engaged in the projects and the protection of the general public. Therefore, it is DDC's policy that work carried out by Contractors on DDC contracts must, at a minimum, comply with the most current versions of all applicable federal, state and city laws, rules, and regulations, including without limitation:

- Code of Federal Regulations, Title 29, Part 1926 (29 CFR 1926) and applicable Sub-parts of Part 1910 – U.S. Occupational Safety and Health Administration (OSHA);
- Federal Highway Administration – Manual on Uniform Traffic Control Devices (MUTCD);
- New York Codes, Rules and Regulations (NYCRR), Title 12, Part 23 – Protection in Construction, Demolition and Excavation Operations;
- New York Codes, Rules and Regulations (NYCRR), Title 16, Part 753 – Protection of Underground Facilities;
- New York City Administrative Code, Title 28 – New York City Construction Codes;
- Rules of the City of New York, Title 15, Chapter 13 – Rules Pertaining To the Prevention of the Emission of Dust from Construction Related Activities;
- Rules of the City of New York, Title 15, Chapter 28 – Citywide Construction Noise Mitigation;
- Rules of the City of New York, Title 34 Chapter 2 – NYCDOT Highway Rules.

The Contractor will be required to comply with all new and/or revised federal, state and city laws, rules, and regulations, issued during the course of the project, at the expense of the Contractor without any additional costs to the DDC.

II. PURPOSE

The purpose of this policy is to ensure that Contractors perform their work and supervise their employees in accordance with all applicable federal, state and city rules and regulations. Further, Contractors will be expected to minimize or eliminate jobsite and public hazards, through a planning, inspection, auditing and corrective action process. The goal is to control risks so that injuries, illnesses, and accidents to contractors' employees, DDC employees and the general public, as well as damage to city-owned and private property, are reduced to the lowest level feasible.

III. DEFINITIONS

Agency Chief Contracting Officer (ACCO): The ACCO will mean the person delegated authority by the Commissioner to organize and supervise the procurement activity of subordinate Agency staff in conjunction with the City Chief Procurement Officer (CCPO).

Competent Person: As defined by OSHA, an individual who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees or the general public, and who has authorization to take prompt corrective measures to eliminate them. This individual will have completed, at a minimum an authorized 30-hour OSHA Construction Safety Course. The Contractor may be required to provide more than one competent person due to construction operations and based on the number of active work sites.

Construction Safety Auditor: A representative of the Office of Construction Safety who provides inspection and assessment services to enhance health and safety on all DDC construction projects. The activities of the Construction Safety Auditor include performing site audits, reviewing safety plans, reviewing construction permits, drawings, verifying Contractor's compliance with applicable federal, state and city laws, rules, regulations, and DDC Contract Safety Requirements, etc. and rendering technical advice and assistance to DDC Resident Engineers and Project Managers.

Office of Construction Safety: A unit of DDC Safety and Site Support that assesses contractor's safety on DDC jobsites and advises responsible parties of needed corrective actions.

Registered Construction Superintendent: For certain projects, as defined in New York City Construction Codes – Title 28, the contractor will provide a Construction Superintendent registered with the NYC Department of Buildings and responsible for all duties as defined in Chapter 33 of Title 1 of the Rules of the City of New York.

Contractor: For purposes of these Safety Requirements, the term "Contractor" will mean any person or entity that enters into a contract for the performance of construction work on a DDC project. The term "Contractor" will include any person or entity which enters into any of the following types of contracts: (1) a prime construction contract for a specific project, (2) a prime construction contract using the Job Order Contracting System ("JOCS Contract"), and (3) a subcontract with a CM/Builder ("First Tier Subcontract").

Daily Safety Job Briefing: Daily jobsite safety briefings, given to all jobsite personnel at project site by the Contractor before work begins and/or if hazards or potential hazards are discovered while working, with the purpose of discussing the scheduled activities for the day, the hazards related to these activities, activity specific safety procedures, and Job Hazard Analysis associated with the scheduled construction work. Daily jobsite briefings will be documented, available at the jobsite, and will include at a minimum, topics, name and signature of the person conducting the briefing session, names and signatures of attendants, name of the designated competent person, contactor's name, DDC Project ID, date, time, and location.

Director – Office of Construction Safety: Responsible for the operations of the Office of Construction Safety and the DDC Site Safety management programs.

Job Hazard Analysis (JHA): A process of identifying the major job tasks and any potential site-specific hazards that may be present during construction and establishing the means and methods to eliminate or control those hazards. A JHA will be documented, available at the jobsite and will include at a minimum work tasks, being performed, identified hazards, control methods for the identified hazards, contractor's name, DDC Project ID, location, date, name and signature of certifying person. A JHA is a living document that will be re-evaluated and revised to address new hazards and tasks that may develop and will be present at the worksite and produced upon request.

Qualified Person: As defined by OSHA, an individual who, by possession of a recognized degree, certificate, license, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his or her ability to solve problems relating to the subject matter, the work, or the project. Qualified Persons are required under regulation to address issues pertaining, but without limit, to fall protection, scaffold design, maintenance and protection of traffic, and excavation protective system, among others.

Project Site: Those areas indicated in the Contract Documents where the Work is to be performed.

Project Safety Representative: The designated Project Safety Representative will have at a minimum an OSHA 30-hour Construction Safety Course and other safety training applicable to Contractor's/subcontractor's project work. This individual will be responsible to oversee safety performance of the required construction work, conduct documented daily safety inspections, and implement corrective actions to maintain a safe work site. The Project Safety Representative must have sufficient experience and skills necessary to thoroughly understand the health and safety hazards and controls and must have authority to undertake corrective actions. A dedicated full-time Project Safety Representative may be required on large projects and projects deemed by DDC to be particularly high risk. DDC reserves the right to request a dedicated full-time Project Safety Representative for any reason at any time during the course of the project at the expense of the Contractor without any additional costs to the DDC. The full-time Project Safety Representative will be present at the site during all work activities.

Resident Engineer ("RE"): Representative of the Commissioner duly designated by the Commissioner to be his/her representative at the site of the work. The RE may be a consultant retained by DDC, including a Construction Management (CM) or Resident Engineer Inspection (REI) firm. If DDC has retained a CM, REI or other consultant firm to perform management and oversite for the Project (e.g., CM-Builder, CM-Design-Builder, Project Manager, Program Manager), that CM, REI or other consultant is the Resident Engineer for purposes of these Safety Requirements.

Safety Questionnaire: Used by DDC to evaluate Contractor's current and past safety performance. It is required to be completed by all Contractors initially when submitting bids for Construction work, or when being pre-qualified

and updated annually or as requested by the DDC.

Site Safety Manager: For certain projects, as defined in New York City Construction Codes – Title 28, the Contractor will provide a Site Safety Manager with a Site Safety Manager License issued by the New York City Department of Building.

Site Safety Plan: A site-specific safety plan developed by the Contractor for a DDC project. The Site Safety Plan will identify the project work scope, identify hazards associated with the project work and include project specific safety procedures and training appropriate and necessary to complete the work. The Site Safety Plan will be submitted within 30 days from the Award Date or as otherwise directed and is subject to review and acceptance by the Office of Construction Safety prior to the commencement of work at the site.

Unsafe or Unhealthy Condition: A condition that could be potentially hazardous to the health and safety of personnel or the public, and/or damaging to equipment, machinery, property, or the environment.

Weekly Safety Meetings: Weekly jobsite safety meetings, given to all jobsite personnel by Contractor, with the purpose of discussing general safety topics and job specific requirements encountered at the DDC work site. Weekly safety meetings will be documented and will include at a minimum, topics, name and signature of the person conducting the meeting, names and signatures of attendees, contractor's name, DDC Project ID, date, and location.

Work: The construction required by the Contractor's Contract Documents whether completed or partially completed, performed by the Contractor/ subcontractors. Work refers to the furnishing of labor, furnishing and incorporating materials and equipment into the construction and providing any service required by the Contract Documents to fulfill the Contractor's obligation to complete the Project. For the purposes of these Safety Requirements, the term "Work" includes all Utility Interference work (commonly referred to as "Section U", "EP-7", and "Joint Bid" work) performed in association with this Contract.

IV. RESPONSIBILITIES

All persons who manage, perform, and provide support for construction projects will conduct operations in compliance with the requirements identified in this Policy and all applicable governing regulatory agency requirements and guidelines pertaining to safety in construction.

A. Resident Engineer

1. Review and facilitate Contractor(s) Site Safety Plan submittals to DDC for acceptability.
2. Notify the Office of Construction Safety of the commencement of construction work.
3. Develop and implement a training verification process to ensure that all CM/REI, consultant, Contractor, and subcontractor employees are properly trained. Maintain all applicable initial and refresher training records and assures documentation availability on site.
4. Maintain documentation of and attend weekly safety meetings and daily safety job briefings.
5. Assure that Contractor(s) JHA's are current to reflect the work tasks being performed, hazards, and control methods to mitigate the identified hazards. Verify that all employees at the job site are trained on the JHAs and maintain supporting documentation on site.
6. Assure adequate planning for all critical construction activities (crane operation, excavation, confined space entry, etc.) including coordination between Contractor(s) /DDC/ other Agencies as required.
7. Maintain custody of all construction related permits, plans, approvals, drawings, etc., related to the project and assure their availability on site.
8. Recognize, minimize, or eliminate jobsite and public hazards, through required planning, inspection, verification, and corrective action process.
9. Monitor the conditions at the site for conformance with the Contractor's Site Safety Plan, DDC policies, permits, and all applicable regulations and documentation that pertain to construction safety.
10. Notify the Contractor and DDC immediately upon determination of any condition or activity existing which is not in compliance with the Contractor's Site Safety Plan, applicable federal, state or local codes or any

condition that presents a potential risk of injury to the public or workers or possible damage to property. Direct the Contractor to provide such labor, materials, equipment, and supervision to remedy such conditions.

11. Notify the Office of Construction Safety and the ACCO's Insurance and Risk Management Unit of project-related accidents, incidents, and near misses as per DDC's Construction Safety Emergency and Accident Notification and Response Procedure within two (2) hours.
12. In case of an accident, incident, or near miss, RE is responsible to protect the integrity of the accident site including but not limited to: the safeguarding of all evidence, documentation of all personnel on site at the time of the accident, gather facts related to all accidents, incidents, or near miss, and prepare required DDC Construction Accident Report as per DDC's Construction Safety Emergency and Accident Notification and Response Procedure. Maintain all records pertaining to accidents, incidents, and near miss and have them available upon request.
13. Notify the Office of Construction Safety within two (2) hours of the start of an inspection by any outside/ regulatory agency personnel, including NYS, OSHA, NYC DOB or any other City/State/Federal oversight entity and forward a copy of the inspection report within one business day of its receipt.
14. Escort and assist Construction Safety Auditors during all field and record audits.
15. Report any emergency conditions to the Office of Construction Safety immediately.

Note: In addition to the responsibilities listed above, if the Resident Engineer is a CM/REI or other non-City party hired by the City to manage the Project, the Resident Engineer is also required to do the following:

16. Provide personnel who are certified and or trained appropriately for the requirements of the project.
17. Perform an investigation for any project-related accidents, incidents, and near misses. Within 24-hours of the time of the accident, incident, or near miss, the CM/REI will submit an investigation report to the Office of Construction Safety. Such report will include proposed remedial measures and implementation of corrective actions to prevent recurrence.

DDC reserves the right to request that the CM/REI replace any CM/REI personnel for any reason at any time during the project.

B. Construction Contractors

Note: For CM-Build and CM-Design-Build Projects, the CM will meet all requirements listed in this section, as well as the Resident Engineer section above.

1. Submit a completed Safety Questionnaire and other safety performance related documentation with its bid or as part of a pre-qualification package.
2. Submit a Site Safety Plan within 30 days from the Award Date or as otherwise directed. The Site Safety Plan is subject to review and acceptance by the Office of Construction Safety prior to the commencement of work at the site. The Site Safety Plan will be revised and updated as necessary during the course of the project. If requested by the Office of Construction Safety, the Site Safety Plan must be developed and submitted for approval using a web-based system, the Site Safety Plan Application (SSP App).
3. Designate and identify a Project Safety Representative in the Site Safety Plan. The Contractor will immediately notify the Office of Construction Safety, in a form and manner acceptable to the Office of Construction Safety, of any permanent change to the designated Project Safety Representative. In the event the primary designated Project Safety Representative is temporary unable to perform his or her duties, an alternate Project Safety Representative will be provided. Resumes, outlining the qualification and experience for the Project Safety Representative (s) will be included in the Site Safety Plan and available upon request. DDC reserves the right to request the Contractor to replace a Project Safety Representative for any reason at any time during the course of the project.
4. Designate and identify a Competent Person(s) in the Site Safety Plan. Contractor/subcontractor may be required to provide more than one competent person due to construction operations and based on a number of work tasks/areas. DDC reserves the right to request the Contractor to replace a Competent Person or provide additional Competent Person(s) for any reason at any time during the course of the project. The Competent Person will be present at the site during all work activities.
5. For certain projects, as defined in New York City Construction Codes – Title 28, designate and identify the Licensed Site Safety Manager or Registered Construction Superintendent. Resumes, outlining the qualification and experience for the Licensed Site Safety Manager or Registered Construction Superintendent will be included in the Site Safety Plan and available upon request. The Contractor will immediately notify the Office

of Construction Safety, in a form and manner acceptable to the Office of Construction Safety, of any permanent change to the designated Site Safety Manager and/or Construction Superintendent. In the event the primary designated Site Safety Manager or Construction Superintendent is temporarily unable to perform his or her duties, an alternate Licensed Site Safety Manager and/or Registered Construction Superintendent will be provided. The Office of Construction Safety must be informed of such change. DDC reserves the right to request the Contractor to replace Site Safety Manager or Construction Superintendent for any reason at any time during the course of the project.

6. Develop a written Job Hazard Analysis (JHA) that identifies safety hazards and control methods for project specific work tasks. A preliminary JHA will be included in the Site Safety Plan submitted by the Contractor. A JHA is a living document that will be re-evaluated and revised to address new hazards and tasks that may develop during the course of the project and will be present at the worksite and produced upon request.
7. Develop project specific safety procedures to protect employees, general public, and property during all construction activities for the duration of the project.
8. Ensure that all employees are aware of the hazards associated with the project through documented formal and informal training and/or other communications. Conduct and document new employee and site-specific safety orientation for all Contractor and subcontractor personnel to review the hazards associated with the project as identified in the Site Safety Plan and the specific safety procedures and controls that will be used to protect workers, the general public and property. The Project Safety Representative will conduct this training prior to mobilization and if necessary during the course of the project. Documentation will be provided to the RE.
9. Prior to performing any work on DDC projects all Contractor's and subcontractor's employees will, at a minimum, have successfully completed, within the previous five calendar years, an OSHA 10-hour construction safety course.

   All training records (OSHA 10-hour, flagger, scaffold, fall protection, confined space, etc.) will be provided to the RE prior to mobilization, included in the Site Safety Plan, kept current during the course of the project, and available for review.
10. Conduct and document weekly safety meetings and daily job briefing sessions for the duration of the project. Attendance at weekly safety meetings and daily job briefing sessions is mandatory. A written record of weekly safety meetings will be available upon request and job briefing sessions will be available at the worksite.
11. As part of the Site Safety Plan, prepare site specific procedures, such as maintenance and protection of traffic plan, steel erection plan, confined space program, fall protection plan, demolition plan, site specific emergency evacuation plan, etc. (if not otherwise provided in the contract documents) and comply with all of its provisions.
12. Have immediately available for review at the project site where actual construction activities are being performed all applicable documentation, including but not limited to: JHAs for work tasks being performed, all required training records, MPT plan (where applicable), Noise and Dust Mitigation Plans, excavation protective system drawings (where applicable), Emergency Evacuation plan, fall protection program (where applicable), confined space program (where applicable), all required permits, daily job briefing records, all required documentation for crane operation (where applicable), daily inspection checklist, scaffold and sidewalk drawings (when applicable), safety data sheets for chemicals in use.
13. Comply with all federal, state and local safety and health rules, laws, and regulations.
14. Comply with all provisions of the Site Safety Plan.
15. Provide, replace, and adequately maintain at or around the project site, suitable and sufficient signage, lights, barricades and enclosures (fences, sidewalk sheds, netting, bracing, etc.). The project specific MPT plan will be developed, implemented, and reviewed during the course of the project.
16. The Project Safety Representative will conduct daily safety inspections, document the inspection results, implement corrective actions for the identified hazards. Maintain the inspection records and have them available upon request.
17. **Report unsafe or unhealthy conditions to the RE as soon as practical, but no more than 24 hours after discovery, and take prompt actions to remove or abate such conditions. Should an imminent dangerous condition be discovered, Contractor will stop all work in the area of danger until corrections are made.**
18. Report all accidents, incidents and near misses involving injuries to workers or the general public, as well as property damage, to the RE within one (1) hour.
19. Following an accident or incident, unless otherwise directed, the Contractor will not remove or alter any equipment, structure, material, or evidence related to the accident or incident. Exception: Immediate emergency procedures taken to secure structures, temporary construction, operations, or equipment that pose a continued imminent danger or facilitate assistance for persons who are trapped or who have sustained bodily injury. Take

additional measures as necessary to secure the accident or incident site and to protect against any further injury or property damage.

20. The Contractor will perform an investigation into the root cause of the accident, incident, or near miss. Within 24 hours of an accident, incident, or near miss, the Contractor will prepare and submit to the RE a written investigation report detailing findings, corrective actions, and hazard mitigation implementation to prevent recurrence.
21. Notify the RE within two (2) hours of the start of an inspection by any outside regulatory agency personnel, including OSHA, NYC DOB, or others.
22. Maintain all records pertaining to all required safety compliance documents, accidents and incidents reports. DDC reserves the right to request copy of any records pertaining to the safety of the project and required by DDC and other federal, state, and city agencies, including but not limited to permits, training records, safety inspection records, drawings, equipment records, etc.
23. Cooperate with DDC Office of Construction Safety/ RE and address DDC recommendations on safety, which will in no way relieve the Contractor of its responsibilities for safety on the project. The Contractor has sole responsibility for safety.

V. SAFETY QUESTIONNAIRE

DDC requires that all Contractors provide information regarding their current and past safety performance and programs. This will be accomplished by the use of the DDC Safety Questionnaire. As a part of the bid submittal package, the contractor will submit a completed DDC Safety Questionnaire listing company workers' compensation experience modification rating and OSHA Incident Rates for the three (3) years prior to the date of the bid opening. DDC may request a Contractor to update its Questionnaire at any time or to provide more detailed information. The Contractor will provide the requested information within 15 days.

The following criteria will be used by DDC in reviewing the Contractor's responsibility, which will be based on the information provided on the questionnaire:

Criteria 1: OSHA Injury and Illness Rates (I&IR) are no greater than the average for the industry (based on the most current Bureau of Labor Statistics data for the Contractors SIC code); and

Criteria 2: Insurance workers compensation Experience Modification Rate (EMR) equal to or less than 1.0; and

Criteria 3: Any willful violations issued by OSHA or NYC DOB within the last three (3) years; and

Criteria 4: A fatality (worker or member of public) and injuries, requiring OSHA notification, experienced on or near Contractor's worksite within the last three (3) years; and

Criteria 5: Past safety performance on DDC projects (accidents; status of site safety plan submittals; etc.)

Criteria 6: OSHA violation history for the last three (3) years;

Criteria 7: Contractor will provide OSHA Injury and Illness Records (currently OSHA 300 and 300A Logs) for the last three (3) years.

If the Contractor fails to meet the basic criteria listed above, the Office of Construction Safety may request, through the ACCO, more details concerning the Contractor's safety experience. DDC may request the Contractor to provide copies of, among other things, accident investigation reports, OSHA records, OSHA and NYC DOB citations, EPA citations and written corrective action plan.

VI. SITE SAFETY PLAN

Within thirty (30) days from the Award Date or as otherwise directed, the Contractor will submit the Site Safety Plan. The Site Safety Plan will identify project work scope, safety hazards associated with the project tasks, and include specific safety procedures and training appropriate and necessary to complete the work. The Site Safety Plan is subject to review and acceptance by the Office of Construction Safety prior to the commencement of work at the site. Due to the project work scope and project duration, the Office of Construction Safety may grant a conditional acceptance for a Site Safety Plan without all sections being complete. In a case of a "Conditional Acceptance" of a Site Safety Plan,

the Contractor will provide the remaining sections previously incomplete and/or not submitted for review and acceptance by the Office of Construction Safety prior to the commencement of the construction activities. The Office of Construction Safety reserves the right to withdraw the initial "Conditional Acceptance" if the Contractor fails to provide the remaining sections of a Site Safety Plan. Failure by the Contractor to submit an acceptable Site Safety Plan will be grounds for default.

Site Safety Plan requirements: The Site Safety Plan will be a written document and will apply to all project specific Contractor and subcontractor operations, and will have at a minimum, the following elements with each described in a separate section (It may be necessary to modify the basic format for certain unique or high-risk projects, such as tunnels or high-rise construction). All Site Safety Plan sections will be numbered in the order listed below. For sections, which are not applicable for the type of the work being performed by the Contractor on DDC project, the Contractor will in writing indicate "Not applicable based on the project work scope." The Site Safety Plan will include Contractor's name, DDC project ID, project location (s), and development and revision dates. The Site Safety Plan will include the sections, attachments, and appendixes provided in the Site Safety Plan. All pages of the Site Safety Plan will be numbered. If requested by the Office of Construction Safety, the Site Safety Plan must be developed and submitted for approval using a web-based system, the Site Safety Plan Application (SSP App).

1. Project Work Scope – Detailed information regarding work tasks that will be performed by Contractor and subcontractors under the project.
2. Responsibility and Organization – Contractor's organization chart with responsible personnel for the project, including titles, names, contact information, roles, and responsibilities. All Contractor's personnel required by the DDC Safety Requirements will be identified.
3. Safety Training and Education – OSHA 10 Hours training, requirements for daily safety briefings and weekly safety meetings, any work task specific training, responsible staff for implementation of training program for the project.
4. Job Hazard Analysis (JHA) – Project specific Job Hazard Analysis including work tasks, identified hazards, hazard control methods (administrative, engineering, PPE) to protect workers, property and general public, Contractor's name, project id, location, name and signature of a certifying person, hazard assessment date.
5. Protection of Public – Project specific procedures covering safety of the general public during all project construction activities.
6. Hazard Corrective Actions - Procedures for hazard identification, including responsible person(s), frequency of safety inspections, implementation of corrective actions, safety inspection checklist.
7. Accident/Exposure Investigation – Project specific procedures for accident/incident/near miss investigation and implementation of corrective actions. Accident/incident/near miss notification procedure of DDC project staff (timer frame and responsible personnel).
8. Recording and Reporting Injuries – Procedures to meet 29 CFR 1904 requirements.
9. First Aid and Medical Attention – Responsible staff, location and inspection of First Aid kit, directions to local hospitals; emergency telephone numbers.
10. Project Specific Fire Protection and Prevention Program – Project specific procedures, including responsible staff, fire alarm system/methods, hot work procedures, etc.
11. Housekeeping Procedure.
12. Project Specific Illumination Procedure.
13. Project Specific Sanitation Procedure.
14. Personal Protective Equipment (PPE), including Respiratory Protection Program and Hearing Conservation Program, if required.
15. Hazard Communication Program – Contractor's Hazard Communication Program, responsible staff; training; SDS records, project specific list of chemicals; location of the program and SDS records.
16. Means of Egress – Information regarding free and unobstructed egress from all parts of the building or structure; exit marking; maintenance of means of egress, etc.
17. Employee Emergency Action Plan – Project specific: responsible staff, emergency alarm system/devices, evacuation procedure, procedure to account for employees after evacuation, etc.
18. Evacuation Plan – Project specific evacuation plan (drawing/scheme) with exists and evacuation routes.
19. Ionizing/Nonionizing Radiation – Competent person, license and qualification requirements, type of radiation, employee's exposure and protection, safety procedures, etc.

20. Material Handling, Storage, Use and Disposal – Project specific information regarding material storage, disposal, and handling: procedures, plan/drawings, etc.
21. Signs, Signals, and Barricades – Use of danger/warning signs, safety instruction signs, sidewalk closure and pedestrian fencing and barricades (if not included in the MPT plan), etc.
22. Tools – Hand and Power – Safety procedures for the type of tools to be used.
23. Scaffold – Project specific scaffold types, procedures, training requirements, scaffold drawings, designed, sealed, and signed by NYS Licensed Professional Engineer, or as otherwise directed; competent person, criteria for project specific scaffold, falling object protection, procedures for aerial lifts/scissor lifts.
24. Welding and Cutting – Project specific procedure for welding and cutting, including all necessary safety requirements such as fire prevention, personal protective equipment, hot work permits (if not covered by Contractor's Fire Prevention and Protection program, FDNY certificate requirements).
25. Electrical Safety – Project specific procedures, including lock out-tag out.
26. Fall Protection – Project specific information regarding selected fall protection systems, fall protection plan, responsible staff.
27. Cranes, Derrick, Hoists, Elevators, Conveyors – project specific equipment information including type, rated load capacity, manufacture specification requirements, competent person, exposure to falling load, inspection, recordkeeping, clearance requirements, communication procedure, ground lines, permits.
28. Excavation Safety – Competent person; excavation procedures; project specific protective system, including drawings, designed, sealed, and signed by NYS Licensed Professional Engineer, or as otherwise directed.
29. Protection of Underground Facilities and Utilities Procedure, including responsible staff and responsibilities.
30. Concrete and Masonry Construction Procedures
31. Maintenance and Protection of Traffic Plan – Project specific MPT plan, designed, sealed, and signed by NYS Licensed Professional Engineer, or as otherwise directed; flagmen training, public safety, etc.
32. Steel Erection – Site specific erection plan, requirements for applicable written notifications, competent person, fall protection plan, training requirements, etc.
33. Demolition – Engineering survey, including written evidence, disconnection of all effected utilities, identification of all hazardous chemicals, materials, gases, etc., floor openings, chutes, inspection and maintenance of all stairs/passageways, removal of materials/debris/structural elements, lock out/tag out, competent person.
34. Blasting and the Use of Explosives – Project specific safety procedures, warning signs, training/qualification, transportation, storage and use of explosives, inspection.
35. Stairways and Ladders – Types of stairs and ladders, safety procedures, training requirements.
36. Alcohol and Drug Abuse Policy
37. Rodents and Vermin Controls
38. Toxic and Hazardous Substances – Safety procedures for substances that Contractor's and subcontractor's employees can be exposed on project.
39. Noise Mitigation Plan – Completed project specific Noise Mitigation Plan, and noise mitigation procedures.
40. Confined Space Program – Project specific Confined Space Program, responsible staff, training records, equipment information, rescue procedure, list of project specific confined spaces, forms.
41. Construction Vehicles/Heavy Equipment – Type of construction vehicles/heavy equipment to be used on site, procedures
42. Dust Mitigation Plan – Completed project specific Dust Mitigation Plan, and dust mitigation procedures.
43. Working Over and Near Water. Diving Operations – safety procedures including personal protective equipment, fall protection, rescue services, etc.

The most critical component of the Site Safety Plan is the Job Hazard Analysis (JHA) section. The JHA form is a written document prepared by the Contractor. The Contractor will conduct a site and task assessment to identify the tasks and any potential safety or environmental hazards related to performance of the work, eliminate or implement controls for the potential hazards, and identify proper personal protective equipment for the task. The JHA will be communicated to all Contractor/subcontractor personnel on site. The JHA will include safety hazard identification and controls to protect employees, general public, and property.

The initial JHA will be included in the Contractor's Site Safety Plan and the current JHA form will be available at the construction site for reference. A JHA is a living document that will be re-evaluated and revised to address new hazards and tasks that may develop and will be present at the worksite and produced upon request.

VII. KICK-OFF MEETINGS/PRE-CONSTRUCTION AND SAFETY REVIEW

Prior to the start of construction activities on all DDC projects, RE will invite the Office of Construction Safety to the construction kick-off meeting. The Office of Construction Safety representative(s) will participate in this meeting with the Contractor and RE for the purpose of:

A. Reviewing DDC Contract Safety Requirements
B. Reviewing site-specific safety issues based on a project work scope, location, and any other factors which may impact safety of workers and general public.
C. Reviewing the Site Safety Plan and JHA requirements.
D. Reviewing Accident/Incident reporting and investigation procedures.
E. Reviewing designated safety contacts, roles, and responsibilities.
F. Discussing planned inspections and audits of the site by the Office of Construction Safety personnel.

VIII. EVALUATION DURING WORK IN PROGRESS

The Contractor's adherence to these Safety Requirements will be monitored throughout the project. This will be accomplished by the following:

A. Use of a safety checklist by a representative of the Office of Construction Safety (or other designated DDC representative) and the RE during regular inspections and comprehensive audits of the job site. Field Exit Conferences will be held with the RE and Contractor Project Safety Representatives.
B. The RE will continually monitor the safety and environmental performance of the Contractor's employees and work methods. Deficiencies will be brought to the attention of the Contractor's Project Safety Representative on site for immediate correction. The RE will maintain a written record of these deficiencies and have these records available upon request. Any critical deficiencies will be immediately reported to the Office of Construction Safety via telephone (718)391-1911.
C. If the Contractor's safety performance during the project is not up to DDC standards (safety performance measure, accident/incident rate, etc.) the Director – Office of Construction Safety, or his/her designee will meet with the Contractor's Project Safety Representative and other representatives, the RE, and the DDC Environmental Specialist (if environmental issues are involved). The purpose of this meeting is to 1) determine the level of non-compliance; 2) explain and clarify the safety/environmental provisions; 3) agree on a future course of action to correct the deficiencies.
D. If the deficiencies continue, the Commissioner may, without limitation, declare the Contractor in default.
E. The Contractor will within 1 hour inform the RE of all accidents/incidents/near misses including all fatalities, any injuries to employees or members of the general public, and property damage (e.g., structural damage, equipment rollovers, utility damage, loads dropped from crane). The RE will notify the Office of Construction Safety as per DDC's Construction Safety Emergency and Accident Notification and Response Procedure and will maintain a record of all Contractor accidents/incidents for the project.
F. The Contractor and the RE will notify the Office of Construction Safety within two (2) hours of the start of any NYS-DOL/ NYC-COSH/ OSHA/ EPA inspections.

IX. SAFETY PERFORMANCE EVALUATION

The Contractor's safety record, including accident/incident history and DDC safety inspection results, will be considered as part of the Contractor's performance evaluation at the conclusion of the project. Poor safety performance during the course of the project will be a reason to rate a Contractor unsatisfactory which may be reflected in the City's PASSPort system and will be considered for future procurement actions as set forth in the City's Procurement Policy Board Rules.

NOTICE TO BIDDERS

Please be advised that the following Riders to the March 2017 New York City Standard Construction Contract have been attached and incorporated in this Invitation for Bid:

- Rider regarding Community Hiring for Construction Contracts;
- Rider regarding Non-Compensable Delays and Grounds for Extension;
- Rider regarding NYC Earned Safe and Sick Time Act;
- Rider regarding City Fleet and Truck Safety Requirements for City Contractors;
- Rider regarding Certified Payrolls

Other than provisions specifically delineated in the Riders, all other terms of the March 2017 New York City Standard Construction Contract continue to apply in full force and effect.

Community Hiring Rider

For Construction Contracts

Version: February 20, 2025

Program Description

Community Hiring, as authorized under Chapter 79 of the New York City Charter ("Charter"), is an initiative to set workforce goals on City procurement for contractors to employ low-income individuals and residents of economically disadvantaged communities.

The provisions set forth in this Rider shall apply to contracts with a total value exceeding three million dollars, unless otherwise exempt under the rules set forth under the Community Hiring Rules, adopted as Title 74 of the Rules of the City of New York (RCNY). Under 74 RCNY § 1-03(b), the following contracts are exempt: preferred source contracts; contracts for the performance of services by a city-affiliated not-for-profit corporation, goods contracts; contracts in an amount below the small purchase threshold; contracts for investigative or confidential services; contracts subject to federal or state funding requirements that preclude or substantially conflict with the application of Community Hiring Goals; contracts awarded through the United States General Services administration, or through the New York State Office of General Services; contracts for emergency demolition services procured by the Department of Housing Preservation and Development; contracts for which contractor selection is made by an elected official other than the Mayor or an agency other than a Mayoral Agency; contracts subject to 9 RCNY § 1-02(f); contracts designated for inclusion in a mentoring program as defined in Section 1206 or 1309 of the Charter; and contracts for banking services, electronic payment services, or other related services procured by the New York City Department of Finance.

The Community Hiring Rules are hereby incorporated in this Contract by reference and all terms used herein shall have the meanings given such terms in the Community Hiring Rules. In the event of any conflict between the Community Hiring Rules and this Rider, the rules shall control. As of the execution of this Contract, the Contactor represents that it has read, in its entirety, and agrees to comply with the Community Hiring Rules.

The Community Hiring program supersedes the HireNYC initiatives and the related riders, including, but not limited to references to the Public Assistance Commitment Rider and the HireNYC Hiring and Employment Rider. Article 35.6 of this Contract is amended and replaced with the Community Hiring Rules.

Community Hiring Requirements

The Contractor agrees to comply with the requirements of the Community Hiring Rules in the performance of this Contract.

A. Community Hiring Goal

Pursuant to 74 RCNY § 4-02(b), the Contractor shall make best efforts to meet the applicable Community Hiring Goal to employ Residence-Based Community Hires as defined in 74 RCNY § 2-01(a) for contracts involving construction work.

For each Contract involving Construction Work that is not subject to a Project Labor Agreement, the Contractor shall agree to make best efforts to meet the Community Hiring Goal of 30 percent of cumulative labor hours of construction work to be performed by Residence-Based Community Hires as established in 74 RCNY § 4-02(b)(1). For contracts involving Construction Work that are subject to a Project Labor Agreement, the Contractor shall agree to make best efforts to meet the numerical goal(s) regarding Residence-Based Community Hires and Apprentices established in such Project Labor Agreement.

In accordance with 74 RCNY § 5-01(b), the Contractor shall require its subcontractors, as defined under 74 RCNY § 1-02, to make best efforts to meet the applicable Community Hiring Goal.

B. Advertising Employment Opportunities

The Contractor, except those performing Construction Work pursuant to a Project Labor Agreement, agrees to advertise the Employment Opportunities, as defined in 74 RCNY § 1-02, in conspicuous places available to the public and in a manner reasonable for the industry.

For purposes of meeting a Community Hiring Goal, the Contractor shall notify a Referral Source, as provided in accordance with 74 RCNY § 3-02(a), of the job opportunities to be filled by Community Hires. The Contractor shall provide notice to the Office of Community Hiring and Workforce Development (OCH) when the Referral Source has impeded the Contractor's efforts to meet the Community Hiring Goal.

C. System Enrollment and Reporting

The Contractor shall enroll with an electronic system designated by the Director of OCH in accordance with 74 RCNY § 5-01(e).

Once enrolled into the system, the Contractor shall be responsible for updating the information in the system in a reasonable and timely manner.

The Contractor may fulfill the advertising requirement set forth in 74 RCNY § 5-01(c) by posting in such system all the relevant information of an Employment Opportunity to be filled by Community Hires. The Contractor shall also provide, upon request by the City with reasonable notice, any information related to the Contractor's compliance with or progress towards meeting the Community Hiring Goal.

Records

A. Retention

The Contractor shall maintain records in accordance with the applicable requirements set forth in 74 RCNY §§ 6-01 and 6-02.

For purposes of 74 RCNY § 6-01(b), the Contractor shall designate a representative to monitor all activity related to compliance to ensure that the Contractor is exercising best efforts to meet the Community Hiring Goal and maintain records to submit the documentation relating to the provisions herein.

B. Access to Records

The Contractor shall furnish, and require its subcontractors to furnish, all information and reports in accordance with the laws, rules, regulations or guidance from the City.

Compliance

Without limitation to any other provisions under this Contract and any other remedies available to the City, a failure to comply with the requirements under the Community Hiring Rules is a non-compliance that may be subject to civil penalties pursuant to Chapter 7 of the Community Hiring Rules and may be considered as a factor in evaluating contract performance in accordance with 9 RCNY § 4-01.

A. Best Efforts

Where the Contractor has failed to meet the Community Hiring Goal, the Contractor shall demonstrate that it exercised best efforts to meet the goal. Where determined, as set forth in 74 RCNY § 5-03, that the Contractor failed to make best efforts, the City shall send written notice to the Contractor's designated representative, notwithstanding the notice provisions in the Contract. The Contractor shall respond in accordance with the instructions in the notice. Failure to timely respond can result in a non-compliance determination subject to civil penalties as set forth in 74 RCNY § 7-01.

B. Corrective Action

Where the City determines that the non-compliance may be remedied through a corrective action and provides notice to the Contractor pursuant to 74 RCNY § 7-02(a)(2), the Contractor shall respond in accordance with the requirements outlined in the notice. The Contractor is responsible for timely demonstration of taking the requisite corrective action. Demonstration of corrective action to the satisfaction of the Director of OCH, may result in waiving of the civil penalties[1] as set forth in the Community Hiring Rules.

[1] Only civil penalties relating to non-compliance with the Community Hiring Rules can be waived in this instance.

C. Civil Penalties

Where Contractor is found non-compliant subject to civil penalties, the City can impose a civil penalty amount in accordance with the schedule set forth in 74 RCNY § 7-03.

The City may withhold from the Contractor the amount of the civil penalties upon final determination as set forth in 74 RCNY § 7-01(d).

RIDER TO NEW YORK CITY STANDARD CONSTRUCTION CONTRACT (MARCH 2017) REGARDING NON-COMPENSABLE DELAYS AND GROUNDS FOR EXTENSION

The following provisions supersede the corresponding provisions in the March 2017 version of the New York City Standard Construction Contract:

1. Section **11.5.1** provides as follows:

   11.5.1 The acts or omissions of public or government bodies (other than **City** agencies) or of any third parties who are disclosed in the **Contract Documents,** or those third parties who are ordinarily encountered or who are generally recognized as related to the **Work**, including but not limited to, **Other Contractors**, utilities or private enterprises;

2. Section **11.5.6** provides as follows:

   11.5.6 Climatic conditions, storms, floods, droughts, tidal waves, fires, hurricanes, earthquakes, landslides or other catastrophes or acts of God; acts of war or of the public enemy or terrorist acts; disruption, outage or power failure caused by a utility's inability or failure to provide service, pandemics, epidemics, outbreaks of infectious disease or any other public health emergency; other states of emergency declared by the City, State or Federal government , quarantine restrictions, and freight embargoes; including the **City's** reasonable responses to any of the above; and

3. Section **13.3** provides as follows:

   13.3 Grounds for Extension: If such application is made, the **Contractor** shall be entitled to an extension of time for delay in completion of the **Work** caused solely:

   13.3.1 By any of the acts or omissions of the **City**, its officials, agents or employees set forth in Articles **11.4.1.1** through **11.4.1.9**; or

   13.3.2 By or attributable to any of the items set forth in Articles **11.5.1** through **11.5.7**.

   13.3.3 The **Contractor** shall, however, be entitled to an extension of time for such causes only for the number of **Days** of delay which the **ACCO** or the Board may determine to be due solely to such causes, and then only if the **Contractor** shall have strictly complied with all of the requirements of Articles 9 and 10.

NYC EARNED SAFE AND SICK TIME ACT CONTRACT RIDER

(To supersede Section 4.06 of the January 2018 Appendix A and Section 35.5 of the March 2017 Standard Construction Contract and to be attached to other City contracts and solicitations)

A. *Introduction and General Provisions.*

1. The Earned Safe and Sick Time Act ("ESSTA"), codified at Title 20, Chapter 8 of the New York City Administrative Code, also known as the "Paid Safe and Sick Leave Law," requires covered employees (as defined in Admin. Code § 20-912) in New York City ("City") to be provided with paid safe and sick time. Contractors of the City or of other governmental entities may be required to provide safe and sick time pursuant to the ESSTA. The ESSTA is enforced by the City's Department of Consumer and Worker Protection ("DCWP"), which has promulgated 6 RCNY §§ 7-101 and 201 *et seq*. ("DCWP Rules").

2. The Contractor agrees to comply in all respects with the ESSTA and the DCWP Rules, and as amended, if applicable, in the performance of this agreement. The Contractor further acknowledges that such compliance is a material term of this agreement and that failure to comply with the ESSTA in performance of this agreement may result in its termination.

3. The Contractor must notify (with a copy to DCWP at ComplianceMonitoring@dcwp.nyc.gov) the Agency Chief Contracting Officer of the City Agency or other entity with whom it is contracting in writing within 10 days of receipt of a complaint (whether oral or written) or notice of investigation regarding the ESSTA involving the performance of this agreement. Additionally, the Contractor must cooperate with DCWP's guidance and must comply with DCWP's subpoenas, requests for information, and other document demands as set forth in the ESSTA and the DCWP Rules. More information is available at https://www1.nyc.gov/site/dca/about/paid-sick-leave-what-employers-need-to-know.page.

4. Upon conclusion of a DCWP investigation, Contractor will receive a findings letter detailing any employee relief and civil penalties owed. Pursuant to the findings, Contractor will have the opportunity to settle any violations and cure the breach of this agreement caused by failure to comply with the ESSTA either i) without a trial by entering into a consent order or ii) appearing before an impartial judge at the City's administrative tribunal. In addition to and notwithstanding any other rights and remedies available to the City, non-payment of relief and penalties owed pursuant to a consent order or final adjudication within 30 days of such consent order or final adjudication may result in the termination of this agreement without further opportunity to settle or cure the violations.

5. The ESSTA is briefly summarized below for the convenience of the Contractor. The Contractor is advised to review the ESSTA and the DCWP Rules in their entirety. The Contractor may go to www.nyc.gov/PaidSickLeave for resources for employers, such as Frequently Asked Questions, timekeeping tools and model forms, and an event calendar of upcoming presentations and webinars at which the Contractor can get more information about how to comply with the ESSTA and the DCWP Rules. The Contractor acknowledges that it is responsible for compliance with the ESSTA and the DCWP Rules notwithstanding any inconsistent language contained herein.

B. *Pursuant to the ESSTA and DCWP Rules: Applicability, Accrual, and Use.*

1. An employee who works within the City must be provided paid safe and sick time.[1] Employers with one hundred or more employees are required to provide 56 hours of safe and sick time for an employee each calendar year. Employers with fewer than one hundred employees are required to provide 40 hours of sick leave each calendar year. Employers must provide a minimum of one hour of safe and sick time for every 30 hours worked by an employee and compensation for such safe and sick time must be provided at the greater of the employee's regular hourly rate or the minimum wage at the time the paid safe or sick time is taken. Employers are not discouraged or prohibited from providing more generous safe and sick time policies than what the ESSTA requires.

2. Employees have the right to determine how much safe and sick time they will use, provided that an employer may set a reasonable minimum increment for the use of safe and sick time not to exceed four hours per day. For the use of safe time or sick time beyond the set minimum increment, an employer may set fixed periods of up to thirty minutes beyond the minimum increment. In addition, an employee may carry over up to 40 or 56 hours of unused safe and sick time to the following calendar year, provided that no employer is required to carry over unused paid safe and sick time if the employee is paid for such unused safe and sick time and the employer provides the employee with at least the legally required amount of paid safe and sick time for such employee for the immediately subsequent calendar year on the first day of such calendar year.

3. An employee entitled to safe and sick time pursuant to the ESSTA may use safe and sick time for any of the following:

a. such employee's mental illness, physical illness, injury, or health condition or the care of such illness, injury, or condition or such employee's need for medical diagnosis or preventive medical care;

b. such employee's care of a family member (an employee's child, spouse, domestic partner, parent, sibling, grandchild, or grandparent, the child or parent of an employee's spouse or domestic partner, any other individual related by blood to the employee, and any other individual whose close association with the employee is the equivalent of a family relationship) who has a mental illness, physical illness, injury or health condition or who has a need for medical diagnosis or preventive medical care;

---

[1] Pursuant to the ESSTA, if fewer than five employees work for the same employer, and the employer had a net income of less than one million dollars during the previous tax year, such employer has the option of providing such employees uncompensated safe and sick time.

c. closure of such employee's place of business by order of a public official due to a public health emergency;

d. such employee's need to care for a child whose school or childcare provider has been closed due to a public health emergency; or

e. when the employee or a family member has been the victim of a family offense matter, sexual offense, stalking, or human trafficking:

1. to obtain services from a domestic violence shelter, rape crisis center, or other shelter or services program for relief from a family offense matter, sexual offense, stalking, or human trafficking;
2. to participate in safety planning, temporarily or permanently relocate, or take other actions to increase the safety of the employee or employee's family members from future family offense matters, sexual offenses, stalking, or human trafficking;
3. to meet with a civil attorney or other social service provider to obtain information and advice on, and prepare for or participate in any criminal or civil proceeding, including but not limited to, matters related to a family offense matter, sexual offense, stalking, human trafficking, custody, visitation, matrimonial issues, orders of protection, immigration, housing, discrimination in employment, housing or consumer credit;
4. to file a complaint or domestic incident report with law enforcement;
5. to meet with a district attorney's office;
6. to enroll children in a new school; or
7. to take other actions necessary to maintain, improve, or restore the physical, psychological, or economic, health or safety of the employee or the employee's family member or to protect those who associate or work with the employee.

4. An employer must not require an employee, as a condition of taking safe and sick time, to search for a replacement. However, where the employee's need for safe and sick time is foreseeable, an employer may require an employee to provide reasonable notice of the need to use safe and sick time. For an absence of more than three consecutive work days, an employer may require reasonable documentation that the use of safe and sick time was needed for a reason listed in Admin. Code § 20-914; and/or written confirmation that an employee used safe and sick time pursuant to the ESSTA. However, an employer may not require documentation specifying the nature of a medical condition, require disclosure of the details of a medical condition, or require disclosure of the details of a family offense matter, sexual offense, stalking, or human trafficking, as a condition of providing safe and sick time. Health information and information concerning family offenses, sexual offenses, stalking or human trafficking obtained solely due to an

employee's use of safe and sick time pursuant to the ESSTA must be treated by the employer as confidential. An employer must reimburse an employee for all reasonable costs or expenses incurred in obtaining such documentation for the employer.

5. An employer must provide to all employees a written policy explaining its method of calculating sick time, policies regarding the use of safe and sick time (including any permissible discretionary conditions on use), and policies regarding carry-over of unused time at the end of the year, among other topics. It must provide the policy to employees using a delivery method that reasonably ensures that employees receive the policy. If such employer has not provided its written policy, it may not deny safe and sick time to an employee because of non-compliance with such a policy.

6. An employer must provide a pay statement or other form of written documentation that informs the employee of the amount of safe/sick time accrued and used during the relevant pay period and the total balance of the employee's accrued safe/sick time available for use.

7. Safe and sick time to which an employee is entitled must be paid no later than the payday for the next regular payroll period beginning after the safe and sick time was used.

C. *Exemptions and Exceptions*. Notwithstanding the above, the ESSTA does not apply to any of the following:

1. an independent contractor who does not meet the definition of employee under N.Y. Labor Law § 190(2);

2. an employee covered by a valid collective bargaining agreement, if the provisions of the ESSTA are expressly waived in such agreement and such agreement provides a benefit comparable to that provided by the ESSTA for such employee;

3. an audiologist, occupational therapist, physical therapist, or speech language pathologist who is licensed by the New York State Department of Education and who calls in for work assignments at will, determines their own schedule, has the ability to reject or accept any assignment referred to them, and is paid an average hourly wage that is at least four times the federal minimum wage;

4. an employee in a work study program under Section 2753 of Chapter 42 of the United States Code;

5. an employee whose work is compensated by a qualified scholarship program as that term is defined in the Internal Revenue Code, Section 117 of Chapter 20 of the United States Code; or

6. a participant in a Work Experience Program (WEP) under N.Y. Social Services Law § 336-c.

D. *Retaliation Prohibited.* An employer shall not take any adverse action against an employee that penalizes the employee for, or is reasonably likely to deter the employee from or interfere with the employee exercising or attempting in good faith to exercise any right provided by the ESSTA. In addition, an employer shall not interfere with any investigation, proceeding, or hearing pursuant to the ESSTA.

E. *Notice of Rights.*

1. An employer must provide its employees with written notice of their rights pursuant to the ESSTA. Such notice must be in English and the primary language spoken by an employee, provided that DCWP has made available a translation into such language. Downloadable notices are available on DCWP's website at https://www1.nyc.gov/site/dca/about/Paid-Safe-Sick-Leave-Notice-of-Employee-Rights.page. The notice must be provided to the employees by a method that reasonably ensures personal receipt by the employee.

2. Any person or entity that willfully violates these notice requirements is subject to a civil penalty in an amount not to exceed $50.00 for each employee who was not given appropriate notice.

F. *Records*. An employer must retain records documenting its compliance with the ESSTA for a period of at least three years, and must allow DCWP to access such records in furtherance of an investigation related to an alleged violation of the ESSTA.

G. *Enforcement and Penalties.*

1. Upon receiving a complaint alleging a violation of the ESSTA, DCWP must investigate such complaint. DCWP may also open an investigation to determine compliance with the ESSTA on its own initiative. Upon notification of a complaint or an investigation by DCWP, the employer must provide DCWP with a written response and any such other information as DCWP may request. If DCWP believes that a violation of the ESSTA has occurred, it has the right to issue a notice of violation to the employer .

2. DCWP has the power to grant an employee or former employee all appropriate relief as set forth in Admin. Code § 20-924(d). Such relief may include, but is not limited to, treble damages for the wages that should have been paid; statutory damages for unlawful retaliation; and damages, including statutory damages, full compensation for wages and benefits lost, and reinstatement, for unlawful discharge. In addition, DCWP may impose on an employer found to have violated the ESSTA civil penalties not to exceed $500.00 for a first violation, $750.00 for a second violation within two years of the first violation, and $1,000.00 for each succeeding violation within two years of the previous violation. When an employer has a policy or practice of not providing or refusing to allow the use of safe and sick time to its employees, DCWP may seek penalties and relief on a per employee basis.

3. Pursuant to Admin. Code § 20-924.2, (a) where reasonable cause exists to believe that an employer is engaged in a pattern or practice of violations of the ESSTA, the Corporation Counsel may commence a civil action on behalf of the City in a court of competent jurisdiction by filing a complaint setting forth facts relating to such pattern or practice and requesting relief, which may include injunctive relief, civil penalties and any other appropriate relief. Nothing in § 20-924.2 prohibits DCWP from exercising its authority under section 20-924 or the Charter, provided that a civil action pursuant to § 20-924.2 shall not have previously been commenced.

H. *More Generous Polices and Other Legal Requirements.* Nothing in the ESSTA is intended to discourage, prohibit, diminish, or impair the adoption or retention of a more generous safe and sick time policy, or the obligation of an employer to comply with any contract, collective bargaining agreement, employment benefit plan or other agreement providing more generous safe and sick time. The ESSTA provides minimum requirements pertaining to safe and sick time and does not preempt, limit, or otherwise affect the applicability of any other law, regulation, rule, requirement, policy or standard that provides for greater accrual or use by employees of safe and sick leave or time, whether paid or unpaid, or that extends other protections to employees. The ESSTA may not be construed as creating or imposing any requirement in conflict with any federal or state law, rule or regulation.

New York City Mayoral Executive Order No. 39 Rider

City Fleet and Truck Safety Requirements for City Contractors

Version: 11/19/24

Section 1.01 Background

This rider is included in the Agreement and made a part thereof pursuant to the provisions of Mayoral Executive Order 39 of 2024.

Section 1.02 Definitions

A. Capitalized terms not otherwise defined in this rider shall have the meaning ascribed to them in the Agreement.

B. Agreement: The agreement between the City and the Contractor, to which this rider has been added and made a part.

C. City-contracted Vehicle means a Truck (as hereinafter defined) or any other motor vehicle that the Contractor anticipates providing in accordance with this Agreement or using in performing its obligations under this Agreement on a weekly or more frequent basis[1]. This includes those vehicles anticipated to be provided or used by subcontractors to fulfill the scope of a subcontract for work to be performed under a contract that is subject to the Executive Order, regardless of monetary value of the subcontract, if the vehicle is utilized on a weekly or more frequent basis.

D. Contracting Agency: the City agency or office through which the City of New York has entered into this Agreement.

[1] The following vehicles are not considered City-contracted vehicles and are thus not subject to Executive Order 39: any motor vehicle or truck that is utilized pursuant to (1) contracts registered prior to July 1, 2024, including the renewal, extension, or modification of such contracts; (2) an agency on-call emergency contract; (3) an emergency procurement made pursuant to section 3-06 of title 9 of the Rules of the City of New York or pursuant to an executive order of the Mayor or Governor issued under section 24 or section 29-A of the New York State Executive Law; (4) intergovernmental contracts; (5) government-to-government contracts between the City and any State or Federal government agency; and (6) a contract for utilities, as identified in subdivision (b) of section 825 of the New York City Charter.

E. Contractor: the entity providing services under this Agreement.

F. Executive Order: Mayoral Executive Order 39 of 2024, as it may be amended.

G. High Vision Truck: A Truck with a cab-over or cab-forward design wherein the driver sits in front of the front axle as opposed to conventional cab design wherein the engine and front axle are in front of the driver. The distance from the forward of the center of the vehicle bumper at which the driver can see the top of a 3-foot cone shall not exceed eight feet and the distance beyond the exterior of the passenger side door at which the driver can first see the top of the 4-foot cone shall not exceed six feet.

H. Registration: Registration of this Agreement pursuant to Section 328 of the New York City Charter.

I. Telematics: Automatic vehicle location systems that track vehicle location and speed and alert the driver and another designated person(s) to such location and speed in real time.

J. Truck: A City-contracted Vehicle with a manufacturer's gross vehicle weight rating exceeding 10,000 pounds. The term does not include off-road construction vehicles.

K. Truck Surround Cameras: A system of cameras, sensors, and alerts placed on a Truck that provides a Truck operator with a full view of all four sides of the Truck.

L. Vehicle Safety Plan: A plan with regard to City-contracted Vehicles, approved by the Contracting Agency, that includes the components listed in Section 2.03(A) through (F) of this rider.

Section 2.01 Vehicle Requirements

All City-contracted Vehicles shall conform to the following requirements:

A. Truck Surround Cameras: All Trucks, other than High Vision Trucks, shall be outfitted with truck surround cameras in accordance with the following schedule:
   a. Contracts involving 10 or fewer Trucks: No later than 12 months from Registration.
   b. Contracts involving more than 10 Trucks: No later than 18 months from Registration.
   c. New or replacement Truck acquired after work under this Agreement has begun: Truck must be outfitted with Truck Surround Cameras within 12 months from the date of first using such Truck.
   d. Contractor must submit to the Contracting Agency photographic and purchase order evidence, that is satisfactory to the Contracting Agency, of compliance with this Paragraph (A).

B. Truck Side-guards: Contractor shall provide side-guards for City-contracted Vehicles as applicable pursuant to Section 6-141 of the New York City Administrative Code.

C. Telematics: All City-contracted Vehicles must be installed with Telematics. Data gathered by Telematics must be made available in a manner that is satisfactory to the Contracting Agency.

Section 2.02 Safety Requirements

Contractor shall provide the following:

A. Licensing: Contractors shall ensure proper licensing for all drivers who operate City-contracted Vehicles. Contractors shall ensure that all drivers operating City-contracted Vehicles are enrolled in the New York State License Notification System (LENS) and that all out-of-state licenses are being monitored by Contractor. Contractor must notify the Contracting Agency of any license suspensions and/or arrests tied to unsafe or illegal vehicle operation by any drivers of City-contracted Vehicles.

B. Training: Contractor must provide the Contracting Agency documentation, satisfactory to the Contracting Agency, showing:
    a. That all drivers of City-contracted Vehicles have taken a New York State approved defensive driving class within six months after Registration; or
    b. That all drivers of City-contracted Vehicles have attended a New York State-approved defensive driving class within 3 years prior to Registration; or
    c. That all drivers of City-contracted Vehicles have received alternative safe driver training acceptable to the Contracting Agency that is documented to the satisfaction of the Contracting agency.

C. Crash tracking: Contractors must notify the Contracting Agency of any and all collisions that take place involving City-contracted Vehicles while performing services under this Agreement.

Section 2.03 Vehicle Safety Plan

Within one month after Registration, the Contractor must submit, for review and approval, to Contracting Agency, at the address set forth in the Agreement for notices to the City, and DCAS Fleet (C/O Chief Fleet Management Officer, 23rd Floor South, Municipal Building, 1 Centre Street, NY, NY 10007) a proposed vehicle safety plan that shall include at the minimum the components listed in Paragraphs (A) through (E) below. If directed by the Contracting Agency,

Contractor shall revise said proposed vehicle safety plan in accordance with the directions of the Contracting Agency, and until the Contracting Agency issues its approval thereof, Contractor shall submit a revised proposed vehicle safety plan to the Contracting Agency in each case, within 15 days after receipt by Contractor of directions to that effect from the Contracting Agency. Upon approval of the proposed vehicle safety plan, said proposed plan shall be considered the Vehicle Safety Plan and Contractor shall comply with the terms thereof. Each second anniversary of the approval of the Vehicle Safety Plan the Contractor shall submit an update thereof. The Vehicle Safety Plan shall include at the minimum the following components:

A. Vehicle List: List of City-contracted Vehicles, including the year, make, model, VIN and license plate number of each City-contracted Vehicle;

B. Safety Training: Documentation showing that all drivers of City-contracted Vehicles have completed the training detailed in section 2.02(B) of this Rider;

C. Technology: A list of all relevant technology investments installed on City-contracted vehicles, including but not limited to the technology listed in section 2.01 of this Rider;

D. Crash Tracking: An explanation of Contractor's process of monitoring and reviewing collisions including plans to notify Contracting Agency of collisions that take place while performing services under this Agreement;

E. Corrective Action: A corrective action program for drivers of City-contracted Vehicles that engage in unsafe or dangerous driving behaviors and license monitoring; and

F. Additional Safety Measures: Contractor must indicate if there are any additional safety technologies, safety practices, training, or other procedures that are utilized for City-contracted Vehicles during the term of this Agreement.

Section 3.01 Liquidated Damages

A. Contractor acknowledges that its failure to comply with the provisions of this Vehicle Safety Plan will cause loss and damage to the City, the precise extent of which is difficult to ascertain in monetary terms. For this reason, the parties desire to provide fair and reasonable compensation to the City for such losses, which compensation shall not be construed as a penalty. It is therefore agreed that, in addition to any other liquidated damages that the Contractor shall be required to pay to the City in accordance with the provisions of the Agreement, Contractor shall pay to the City the following:
    a. The sum of $500.00 for each instance of a failure by the Contractor to submit a Vehicle Safety Plan in accordance with the provisions of Section 2.03.

b. The sum of $500.00 for each instance of a failure by the Contractor to comply with the provisions of Section 2.02(A) [Licensing].
c. The sum of $500.00 for each instance of a failure by the Contractor to comply with the provisions of Section 2.02(B) [Training].
d. The sum of $500.00 for each instance of a failure by the Contractor to comply with the provisions of Section 2.02(C) [Crash Tracking].
e. The sum of $500.00 for each instance of a failure by the Contractor to comply with the provisions of Section 2.01(C) [Telematics].
f. The sum of $3,000 for each instance of a failure by the Contractor to comply with the provisions of Section 2.01(A).
g. The Contracting Agency will provide at least 5 working days of notice to the Contractor and opportunity to rectify before implementing these liquidated damages.

B. Liquidated damages received pursuant to this Agreement are not intended to be nor shall they be treated as either a partial or full waiver or discharge of the City's right to indemnification, or the Contractor's obligation to indemnify the City, or to any other remedy provided for in this Agreement or by Law. The City may deduct and retain out of the monies which may become due under this Agreement, the amount of any such liquidated damages; and in case the amount which may become due hereunder shall be less than the amount of liquidated damages suffered by the City, the Contractor shall be liable to pay the difference.

RIDER TO NEW YORK CITY STANDARD CONSTRUCTION CONTRACT (MARCH 2017) REGARDING CERTIFIED PAYROLLS

The following provisions supersede the corresponding provisions in the March 2017 version of the New York City Standard Construction Contract. Article 38 provides as follows:

ARTICLE 38. PAYROLL REPORTS

38.1 The **Contractor** and its **Subcontractor(s)** shall maintain the original payrolls or transcripts thereof which the **Contractor** and its **Subcontractor(s)** are required to maintain and shall submit such original payrolls or transcripts, subscribed and affirmed by it as true, within thirty (30) **Days** after issuance of its first payroll, and every thirty (30) **Days** thereafter, pursuant to Labor Law Section 220(3-a)(a)(iii), as modified by Labor Law Section 220-j. The **Contractor** and **Subcontractor(s)** shall submit such original payrolls or transcripts into the Electronic Certified Payroll Database (as hereinafter defined). If payment requisitions are not submitted at least once a month, the **Contractor** and its **Subcontractor(s)** shall submit original payrolls and transcripts both at the same time payment requisitions are submitted and independently of its payment requisitions. For purposes of this Article 38, "Electronic Certified Payroll Record Database" means the City's publicly accessible online database of electronic certified payroll records through which contractors and subcontractors submit certified payroll reports in an electronic format. The database is accessible at the following link: https://nyc-oti.ecomply.us/

38.2 The **Contractor** shall maintain payrolls or transcripts thereof for six (6) years from the date of completion of the **Work** on this **Contract**. If such payrolls and transcripts are maintained outside of New York City after the completion of the **Work** and their production is required pursuant to this Article 38, the **Contractor** shall produce such records in New York City upon request by the City.

38.3 The **Contractor** and **Subcontractor(s)** shall comply with any written order, direction, or request made by the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law Investigator(s)**, or the **Comptroller**, to provide to the requesting party any of the following information and/or records within five (5) **Days** of such written order, direction, or request:

38.3.1 Such original payrolls or transcripts thereof subscribed and affirmed by it as true and the statements signed by each worker pursuant to this Chapter VIII; and/or

38.3.2 Attendance sheets for each **Day** on which any employee of the **Contractor** and/or any of the **Subcontractor(s)** performed **Work** on the **Site**, which attendance sheet shall be in a form acceptable to the **Agency** and shall provide information acceptable to the **Agency** to identify each such employee; and/or

38.3.3 Any other information to satisfy the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law Investigator(s)** or the **Comptroller**, that this Chapter VIII and the Labor Law, as to the hours of employment and prevailing rates of wages and/or supplemental benefits, are being observed.

CITY OF NEW YORK

STANDARD CONSTRUCTION CONTRACT

March 2017

(NO TEXT ON THIS PAGE)

CITY OF NEW YORK STANDARD CONSTRUCTION CONTRACT

TABLE OF CONTENTS

(NO TEXT ON THIS PAGE) 6
CHAPTER I: THE CONTRACT AND DEFINITIONS 7
ARTICLE 1. THE CONTRACT 7
ARTICLE 2. DEFINITIONS 7
CHAPTER II: THE WORK AND ITS PERFORMANCE 10
ARTICLE 3. CHARACTER OF THE WORK 10
ARTICLE 4. MEANS AND METHODS OF CONSTRUCTION 10
ARTICLE 5. COMPLIANCE WITH LAWS 11
ARTICLE 6. INSPECTION 16
ARTICLE 7. PROTECTION OF WORK AND OF PERSONS AND PROPERTY; NOTICESAND INDEMNIFICATION 17
CHAPTER III: TIME PROVISIONS 18
ARTICLE 8. COMMENCEMENT AND PROSECUTION OF THE WORK 18
ARTICLE 9. PROGRESS SCHEDULES 18
ARTICLE 10. REQUESTS FOR INFORMATION OR APPROVAL 19
ARTICLE 11. NOTICE OF CONDITIONS CAUSING DELAY AND DOCUMENTATION OF DAMAGES CAUSED BY DELAY 19
ARTICLE 12. COORDINATION WITH OTHER CONTRACTORS 23
ARTICLE 13. EXTENSION OF TIME FOR PERFORMANCE 24
ARTICLE 14. COMPLETION AND FINAL ACCEPTANCE OF THE WORK 27
ARTICLE 15. LIQUIDATED DAMAGES 28
ARTICLE 16. OCCUPATION OR USE PRIOR TO COMPLETION 29
CHAPTER IV: SUBCONTRACTS AND ASSIGNMENTS 29
ARTICLE 17. SUBCONTRACTS 29
ARTICLE 18. ASSIGNMENTS 31
CHAPTER V: CONTRACTOR'S SECURITY AND GUARANTEE 32
ARTICLE 19. SECURITY DEPOSIT 32
ARTICLE 20. PAYMENT GUARANTEE 32
ARTICLE 21. RETAINED PERCENTAGE 35
ARTICLE 22. INSURANCE 35
ARTICLE 23. MONEY RETAINED AGAINST CLAIMS 41
ARTICLE 24. MAINTENANCE AND GUARANTY 42
CHAPTER VI: CHANGES, EXTRA WORK, AND DOCUMENTATION OF CLAIM 43
ARTICLE 25. CHANGES 43
ARTICLE 26. METHODS OF PAYMENT FOR OVERRUNS AND EXTRA WORK 43
ARTICLE 27. RESOLUTION OF DISPUTES 46
ARTICLE 28. RECORD KEEPING FOR EXTRA OR DISPUTED WORK OR WORK ON ATIME & MATERIALS BASIS 50
ARTICLE 29. OMITTED WORK 51
ARTICLE 30. NOTICE AND DOCUMENTATION OF COSTS AND DAMAGES;PRODUCTION OF FINANCIAL RECORDS 51
CHAPTER VII: POWERS OF THE RESIDENT ENGINEER, THE ENGINEER ORARCHITECT

AND THE COMMISSIONER 52
ARTICLE 31. THE RESIDENT ENGINEER 52
ARTICLE 32. THE ENGINEER OR ARCHITECT OR PROJECT MANAGER 53
ARTICLE 33. THE COMMISSIONER 53
ARTICLE 34. NO ESTOPPEL 54
CHAPTER VIII: LABOR PROVISIONS 54
ARTICLE 35. EMPLOYEES 54
ARTICLE 36. NO DISCRIMINATION 61
ARTICLE 37. LABOR LAW REQUIREMENTS 63
ARTICLE 38. PAYROLL REPORTS 68
ARTICLE 39. DUST HAZARDS 69
CHAPTER IX: PARTIAL AND FINAL PAYMENTS 69
ARTICLE 40. CONTRACT PRICE 69
ARTICLE 41. BID BREAKDOWN ON LUMP SUM 69
ARTICLE 42. PARTIAL PAYMENTS 70
ARTICLE 43. PROMPT PAYMENT 70
ARTICLE 44. SUBSTANTIAL COMPLETION PAYMENT 71
ARTICLE 45. FINAL PAYMENT 72
ARTICLE 46. ACCEPTANCE OF FINAL PAYMENT 73
ARTICLE 47. APPROVAL BY PUBLIC DESIGN COMMISSION 73
CHAPTER X: CONTRACTOR'S DEFAULT 74
ARTICLE 48. COMMISSIONER'S RIGHT TO DECLARE CONTRACTOR IN DEFAULT 74
ARTICLE 49. EXERCISE OF THE RIGHT TO DECLARE DEFAULT 75
ARTICLE 50. QUITTING THE SITE 75
ARTICLE 51. COMPLETION OF THE WORK 75
ARTICLE 52. PARTIAL DEFAULT 76
ARTICLE 53. PERFORMANCE OF UNCOMPLETED WORK 76
ARTICLE 54. OTHER REMEDIES 76
CHAPTER XI: MISCELLANEOUS PROVISIONS 77
ARTICLE 55. CONTRACTOR'S WARRANTIES 77
ARTICLE 56. CLAIMS AND ACTIONS THEREON 77
ARTICLE 57. INFRINGEMENT 78
ARTICLE 58. NO CLAIM AGAINST OFFICIALS, AGENTS OR EMPLOYEES 78
ARTICLE 59. SERVICE OF NOTICES 78
ARTICLE 60. UNLAWFUL PROVISIONS DEEMED STRICKEN FROM CONTRACT 78
ARTICLE 61. ALL LEGAL PROVISIONS DEEMED INCLUDED 79
ARTICLE 62. TAX EXEMPTION 79
ARTICLE 63. INVESTIGATION(S) CLAUSE 80
ARTICLE 64. TERMINATION BY THE CITY 82
ARTICLE 65. CHOICE OF LAW, CONSENT TO JURISDICTION AND VENUE 85
ARTICLE 66. PARTICIPATION IN AN INTERNATIONAL BOYCOTT 85
ARTICLE 67. LOCALLY BASED ENTERPRISE PROGRAM 86
ARTICLE 68. ANTITRUST 87
ARTICLE 69. MacBRIDE PRINCIPLES PROVISIONS 87
ARTICLE 70. ELECTRONIC FILING/NYC DEVELOPMENT HUB 89
ARTICLE 71. PROHIBITION OF TROPICAL HARDWOODS 89
ARTICLE 72. CONFLICTS OF INTEREST 89

ARTICLE 73. MERGER CLAUSE **89**
ARTICLE 74. STATEMENT OF WORK **89**
ARTICLE 75. COMPENSATION TO BE PAID TO CONTRACTOR **90**
ARTICLE 76. ELECTRONIC FUNDS TRANSFER **90**
ARTICLE 77. RECORDS RETENTION **90**
ARTICLE 78. EXAMINATION AND VIEWING OF SITE, CONSIDERATION OF OTHER SOURCES OF INFORMATION AND CHANGED SITE CONDITIONS **90**
ARTICLE 79. PARTICIPATION BY MINORITY-OWNED AND WOMEN-OWNED BUSINESS ENTERPRISES IN CITY PROCUREMENT **91**
PERFORMANCE BOND #1 ..... **99**
PERFORMANCE BOND #2 ..... **103**
PAYMENT BOND **107**

(NO TEXT ON THIS PAGE)

WITNESSETH:

The parties, in consideration of the mutual agreements contained herein, agree as follows:

CHAPTER I: THE CONTRACT AND DEFINITIONS

ARTICLE 1. THE CONTRACT

1.1 Except for titles, subtitles, headings, running headlines, tables of contents and indices (all of which are printed herein merely for convenience), the following, except for such portions thereof as maybe specifically excluded, shall be deemed to be part of this **Contract**:

1.1.1 All provisions required by law to be inserted in this **Contract**, whether actuallyinserted or not;

1.1.2 The Contract Drawings and Specifications;

1.1.3 The General Conditions and Special Conditions, if any;

1.1.4 The **Contract**;

1.1.5 The Information for Bidders; Request for Proposals; Notice of Solicitation andProposal For Bids; Bid or Proposal, and, if used, the Bid Booklet;

1.1.6 All Addenda issued prior to the receipt of the bids; the Notice of Award; Performance and Payment Bonds, if required; and the Notice to Proceed or the Order to Work.

1.2 Should any conflict occur in or between the Drawings and Specifications, the **Contractor** shall be deemed to have estimated the most expensive way of doing the **Work**, unless the **Contractor** shall have asked for and obtained a decision in writing from the **Commissioner** of the **Agency** that is entering into this **Contract**, before the submission of its bid, as to what shall govern.

ARTICLE 2. DEFINITIONS

2.1 The following words and expressions, or pronouns used in their stead, shall, wherever they appear in this Contract, be construed as follows, unless a different meaning is clear from the context:

2.1.1 **"Addendum"** or **"Addenda"** shall mean the additional Contract provisions and/or technical clarifications issued in writing by the Commissioner prior to the receipt of bids.

2.1.2 **"Agency"** shall mean a city, county, borough or other office, position, department, division, bureau, board or commission, or a corporation, institution or agency of government, the expenses of which are paid in whole or in part from the City treasury.

2.1.3 **"Agency Chief Contracting Officer" (ACCO)** shall mean a person delegated authority by the Commissioner to organize and supervise the procurement activity of subordinate Agency staff in conjunction with the CCPO, or his/her duly authorized representative.

2.1.4 **"Allowance"** shall mean a sum of money which the Agency may include in the total amount of the Contract for such specific contingencies as the Agency believes may be necessary to complete the Work, *e.g.*, lead or asbestos remediation, and for which the Contractor will be paid on the basis of stipulated unit prices or a formula set forth in the Contract or negotiated between the parties provided, however, that if the Contractor is not directed to use the Allowance, the Contractor shall have no right to such money and it shall be deducted from the total amount of the Contract.

2.1.5 **"City"** shall mean the City of New York.

2.1.6 **"City Chief Procurement Officer" (CCPO)** shall mean a person delegated authority by the Mayor to coordinate and oversee the procurement activity of Mayoral agency staff, including the ACCO and any offices which have oversight responsibility for the procurement of construction, or his/her duly authorized representative.

2.1.7 **"Commissioner"** shall mean the head of the Agency that has entered into this Contract, or his/her duly authorized representative.

2.1.8 **"Comptroller"** shall mean the Comptroller of the City of New York.

2.1.9 **"Contract"** or **"Contract Documents"** shall mean each of the various parts of the contract referred to in Article 1 hereof, both as a whole and severally.

2.1.10 **"Contract Drawings"** shall mean only those drawings specifically entitled as such and listed in the Specifications or in any Addendum, or any drawings furnished by the Commissioner, pertaining or supplemental thereto.

2.1.11 **"Contract Work"** shall mean everything required to be furnished and done by the Contractor by any one or more of the parts of the Contract referred to in Article 1, except Extra Work as hereinafter defined.

2.1.12 **"Contractor"** shall mean the entity which executed this Contract, whether a corporation, firm, partnership, joint venture, individual, or any combination thereof, and its, their, his/her successors, personal representatives, executors, administrators, and assigns, and any person, firm, partnership, joint venture, individual, or corporation which shall at any time be substituted in the place of the Contractor under this Contract.

2.1.13 **"Days"** shall mean calendar days, except where otherwise specified.

2.1.14 **"Engineer"** or **"Architect"** or **"Project Manager"** shall mean the person so designated in writing by the Commissioner in the Notice to Proceed or the Order to Work to act as such in relation to this Contract, including a private Architect or Engineer or Project Manager, as the case may be. Subject to written approval by the Commissioner, the Engineer, Architect or Project Manager may designate an authorized representative.

2.1.15 **"Engineering Audit Officer" (EAO)** shall mean the person so designated by the Commissioner to perform responsible auditing functions hereunder.

2.1.16 **"Extra Work"** shall mean Work other than that required by the Contract at the time of award which is authorized by the Commissioner pursuant to Chapter VI of this Contract.

2.1.17 **"Federal-Aid Contract"** shall mean a contract in which the United States (federal) Government provides financial funding as so designated in the Information for Bidders.

2.1.18 **"Final Acceptance"** shall mean final written acceptance of all the Work by the Commissioner, a copy of which shall be sent to the Contractor.

2.1.19 **"Final Approved Punch List"** shall mean a list, approved pursuant to Article 14.2.2, specifying those items of Work to be completed by the Contractor after Substantial Completion and dates for the completion of each item of Work.

2.1.20 **"Law"** or **"Laws"** shall mean the Constitution of the State of New York, the New York City Charter, the New York City Administrative Code, a statute of the United States or of the State of New York, a local law of the City of New York, any ordinance, rule or regulation having the force of law, or common law.

2.1.21 **"Materialman"** shall mean any corporation, firm, partnership, joint venture, or individual, other than employees of the Contractor, who or which contracts with the Contractor or any Subcontractor, to fabricate or deliver, or who actually fabricates or delivers, plant, materials or equipment to be incorporated in the Work.

2.1.22 **"Means and Methods of Construction"** shall mean the labor, materials, temporary structures, tools, plant, and construction equipment, and the manner and time of their use, necessary to accomplish the result intended by this Contract.

2.1.23**"Notice to Proceed" or "Order to Work"** shall mean the written notice issued bythe Commissioner specifying the time for commencement of the Work and the Engineer, Architect or Project Manager.

2.1.24 **"Other Contractor(s)"** shall mean any contractor (other than the entity which executed this Contract or its Subcontractors) who or which has a contract with the City for work on or adjacent to the building or Site of the Work.

2.1.25 **"Payroll Taxes"** shall mean State Unemployment Insurance (SUI), Federal Unemployment Insurance (FUI), and payments pursuant to the Federal Insurance Contributions Act (FICA).

2.1.26 **"Project"** shall mean the public improvement to which this Contract relates.

2.1.27 **"Procurement Policy Board" (PPB)** shall mean the Agency of the City of New York whose function is to establish comprehensive and consistent procurement policies and rules which shall have broad application throughout the City.

2.1.28 **"Required Quantity"** in a unit price Contract shall mean the actual quantity of any item of Work or materials which is required to be performed or furnished in order to comply with the Contract.

2.1.29 **"Resident Engineer"** shall mean the representative of the Commissioner duly designated by the Commissioner to be his/her representative at the site of the Work.

2.1.30 **"Site"** shall mean the area upon or in which the Contractor's operations are carried on, and such other areas adjacent thereto as may be designated as such by the Engineer.

2.1.31 **"Small Tools"** shall mean items that are ordinarily required for a worker's job

function, including but not limited to, equipment that ordinarily has no licensing, insurance or substantive storage costs associated with it; such as circular and chain saws, impactdrills, threaders, benders, wrenches, socket tools, etc.

2.1.32 **"Specifications"** shall mean all of the directions, requirements, and standards of performance applying to the Work as hereinafter detailed and designated under the Specifications.

2.1.33 **"Subcontractor"** shall mean any person, firm or corporation, other than employees of the Contractor, who or which contracts with the Contractor or with its subcontractors to furnish, or actually furnishes labor, or labor and materials, or labor and equipment, or superintendence, supervision and/or management at the Site. Wherever the word Subcontractor appears, it shall also mean sub-Subcontractor.

2.1.34 **"Substantial Completion"** shall mean the written determination by the Engineer that the Work required under this Contract is substantially, but not entirely, complete and the approval of the **Final Approved Punch List**.

2.1.35 **"Work"** shall mean all services required to complete the Project in accordance with the Contract Documents, including without limitation, labor, material, superintendence, management, administration, equipment, and incidentals, and obtaining any and all permits, certifications and licenses as may be necessary and required to complete the Work, and shall include both Contract Work and Extra Work.

CHAPTER II: THE WORK AND ITS PERFORMANCE

ARTICLE 3. CHARACTER OF THE WORK

3.1 Unless otherwise expressly provided in the **Contract Drawings**, **Specifications,** and **Addenda**, the **Work** shall be performed in accordance with the best modern practice, utilizing, unless otherwise specified in writing, new and unused materials of standard first grade quality and workmanship anddesign of the highest quality, to the satisfaction of the **Commissioner**.

ARTICLE 4. MEANS AND METHODS OF CONSTRUCTION

4.1 Unless otherwise expressly provided in the **Contract Drawings**, **Specifications,** and **Addenda**, the **Means and Methods of Construction** shall be such as the **Contractor** may choose; subject, however, to the **Engineer's** right to reject the **Means and Methods of Construction** proposed by the **Contractor** which in the opinion of the **Engineer**:

4.1.1 Will constitute or create a hazard to the **Work**, or to persons or property; or

4.1.2 Will not produce finished **Work** in accordance with the terms of the **Contract**; or

4.1.3 Will be detrimental to the overall progress of the **Project**.

4.2 The **Engineer's** approval of the **Contractor's Means and Methods of Construction**, orhis/her failure to exercise his/her right to reject such means or methods, shall not relieve the **Contractor** of its obligation to complete the **Work** as provided in this **Contract**; nor shall the exercise of such rightto reject

create a cause of action for damages.

ARTICLE 5. COMPLIANCE WITH LAWS

5.1 The **Contractor** shall comply with all **Laws** applicable to this **Contract** and to the **Work** to be done hereunder.

5.2 Procurement Policy Board Rules: This **Contract** is subject to the Rules of the **PPB** ("**PPB** Rules") in effect at the time of the bid opening for this **Contract**. In the event of a conflict between the **PPB** Rules and a provision of this **Contract**, the **PPB** Rules shall take precedence.

5.3 Noise Control Code provisions.

5.3.1 In accordance with the provisions of Section 24-216(b) of the Administrative Code of the **City** ("Administrative Code"), Noise Abatement Contract Compliance, devices and activities which will be operated, conducted, constructed or manufactured pursuant to this **Contract** and which are subject to the provisions of the **City** Noise Control Code shall be operated, conducted, constructed, or manufactured without causing a violation of the Administrative Code. Such devices and activities shall incorporate advances in the art of noise control development for the kind and level of noise emitted or produced by such devices and activities, in accordance with regulations issued by the **Commissioner** of the **City** Department of Environmental Protection.

5.3.2 The **Contractor** agrees to comply with Section 24-219 of the Administrative Code and implementing rules codified at 15 Rules of the City of New York ("RCNY") Section 28-100 *et seq*. In accordance with such provisions, the **Contractor**, if the **Contractor** is the responsible party under such regulations, shall prepare and post a Construction Noise Mitigation Plan at each **Site**, in which the **Contractor** shall certify that all construction tools and equipment have been maintained so that they operate at normal manufacturers operating specifications. If the **Contractor** cannot make this certification, it must have in place an Alternative Noise Mitigation Plan approved by the **City** Department of Environmental Protection. In addition, the **Contractor**'s certified Construction Noise Mitigation Plan is subject inspection by the **City** Department of Environmental Protection in accordance with Section 28-101 of Title 15 of RCNY. No **Contract Work** may take place at a **Site** unless there is a Construction Noise Mitigation Plan or approved Alternative Noise Mitigation Plan in place. In addition, the **Contractor** shall create and implement a noise mitigation training program. Failure to comply with these requirements may result in fines and other penalties pursuant to the applicable provisions of the Administrative Code and RCNY.

5.4 Ultra Low Sulfur Diesel Fuel: In accordance with the provisions of Section 24-163.3 of the Administrative Code, the **Contractor** specifically agrees as follows:

5.4.1 Definitions. For purposes of this Article 5.4, the following definitions apply:

5.4.1(a) "Contractor" means any person or entity that enters into a Public Works Contract with a **City Agency**, or any person or entity that enters into an agreement with such person or entity, to perform work or provide labor or services related to such Public Works Contract.

5.4.1(b) "Motor Vehicle" means any self-propelled vehicle designed for transporting

persons or property on a street or highway.

5.4.1(c) "Nonroad Engine" means an internal combustion engine (including the fuel system) that is not used in a Motor Vehicle or a vehicle used solely for competition,or that is not subject to standards promulgated under Section 7411 or Section 7521 of Title 42 of the United States Code, except that this term shall apply to internal combustion engines used to power generators, compressors or similar equipment used in any construction program or project.

5.4.1(d) "Nonroad Vehicle" means a vehicle that is powered by a Nonroad Engine, fifty (50) horsepower and greater, and that is not a Motor Vehicle or a vehicle used solely for competition, which shall include, but not be limited to, excavators, backhoes, cranes, compressors, generators, bulldozers, and similar equipment, except that this term shall not apply to horticultural maintenance vehicles used for landscaping purposes that are powered by a Nonroad Engine of sixty-five (65) horsepower or less and that are not used in any construction program or project.

5.4.1(e) "Public Works Contract" means a contract with a **City Agency** for a construction program or project involving the construction, demolition, restoration, rehabilitation, repair, renovation, or abatement of any building, structure, tunnel, excavation, roadway, park or bridge; a contract with a **City Agency** for the preparation for any construction program or project involving the construction, demolition, restoration, rehabilitation, repair, renovation, or abatement of any building, structure, tunnel, excavation, roadway, park or bridge; or a contract with a **City Agency** for any final work involved in the completion of any construction program or project involving the construction, demolition, restoration, rehabilitation, repair, renovation, or abatement of any building, structure, tunnel, excavation, roadway, park or bridge.

5.4.1(f) "Ultra Low Sulfur Diesel Fuel" means diesel fuel that has a sulfur content of no more than fifteen parts per million (15 ppm).

5.4.2 Ultra Low Sulfur Diesel Fuel

5.4.2(a) All **Contractors** shall use Ultra Low Sulfur Diesel Fuel in diesel-powered Nonroad Vehicles in the performance of this **Contract**.

5.4.2(b) Notwithstanding the requirements of Article 5.4.2(a), **Contractors** may use diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm)to fulfill the requirements of this Article 5.4.2, where the Commissioner of the **City** Department of Environmental Protection ("DEP Commissioner") has issued a determination that a sufficient quantity of Ultra Low Sulfur Diesel Fuel is not available to meet the needs of **Agencies** and **Contractors**. Any such determination shall expire after six (6) months unless renewed.

5.4.2(c) **Contractors** shall not be required to comply with this Article 5.4.2 where the **City Agency** letting this **Contract** makes a written finding, which is approved, in writing, by the DEP Commissioner, that a sufficient quantity of Ultra Low Sulfur Diesel Fuel, or diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm) is not available to meet the requirements of Section 24-163.3 of the Administrative Code, provided that such **Contractor** in its fulfillment of the requirements of this **Contract**, to the extent practicable, shall use whatever quantity of Ultra Low Sulfur Diesel Fuel or diesel fuel that has a sulfur content of no more than thirty parts per

million (30 ppm) is available. Any finding made pursuant to this Article 5.4.2(c) shall expire after sixty (60) **Days**, at which time the requirements of this Article 5.4.2 shall be in full force and effect unless the **City Agency** renews the finding in writing and such renewal is approved by the DEP Commissioner.

5.4.2(d) **Contractors** may check on determinations and approvals issued by the DEP Commissioner pursuant to Section 24-163.3 of the Administrative Code, if any, at www.dep.nyc.gov or by contacting the **City Agency** letting this **Contract**.

5.4.2(e) The requirements of this Article 5.4.2 do not apply where they are precluded by federal or State funding requirements or where the **Contract** is an emergency procurement.

5.4.3 Best Available Technology

5.4.3(a) All **Contractors** shall utilize the best available technology for reducing the emission of pollutants for diesel-powered Nonroad Vehicles in the performance of this **Contract**. For determinations of best available technology for each type of diesel-powered Nonroad Vehicle, **Contractors** shall comply with the regulations of the **City** Department of Environmental Protection, as and when adopted, Chapter 14 of Title 15 of the Rules of the City of New York (RCNY). The **Contractor** shall fully document all steps in the best available technology selection process and shall furnish such documentation to the **City Agency** or the DEP Commissioner upon request. The **Contractor** shall retain all documentation generated in the best available technology selection process for as long as the selected best available technology is in use.

5.4.3(b) No **Contractor** shall be required to replace best available technology for reducing the emission of pollutants or other authorized technology utilized for a diesel-powered Nonroad Vehicle in accordance with the provisions of this Article 5.4.3 within three (3) years of having first utilized such technology for such vehicle.

5.4.3(c) This Article 5.4.3 shall not apply to any vehicle used to satisfy the requirements of a specific Public Works Contract for fewer than twenty (20) **Days**.

5.4.3(d) The **Contractor** shall not be required to comply with this Article 5.4.3 with respect to a diesel-powered Nonroad Vehicle under the following circumstances:

5.4.3(d)(i) Where the **City Agency** makes a written finding, which is approved, in writing, by the DEP Commissioner, that the best available technology for reducing the emission of pollutants as required by this Article 5.4.3 is unavailable for such vehicle, the **Contractor** shall use whatever technology for reducing the emission of pollutants, if any, is available and appropriate for such vehicle.

5.4.3(d)(ii) Where the DEP Commissioner has issued a written waiver based upon the Contractor having demonstrated to the DEP Commissioner that the use of the best available technology for reducing the emission of pollutants might endanger the operator of such vehicle or those working near such vehicle, due to engine malfunction, the **Contractor** shall use whatever technology for reducing the emission of pollutants, if any, is available and appropriate for such vehicle, which would not endanger the operator of such vehicle or those working near such vehicle.

5.4.3(d)(iii) In determining which technology to use for the purposes of Articles 5.4.3(d)(i) and 5.4.3(d)(ii) above, the **Contractor** shall primarily consider the reduction in emissions of particulate matter and secondarily consider the reduction in emissions of nitrogen oxides associated with the use of such technology, which shall in no event result in an increase in the emissions of either such pollutant.

5.4.3(d)(iv) The **Contractor** shall submit requests for a finding or a waiver pursuant to this Article 5.4.3(d) in writing to the DEP Commissioner, with a copy to the **ACCO** of the **City Agency** letting this **Contract**. Any finding or waiver made or issued pursuant to Articles 5.4.3(d)(i) and 5.4.3(d)(ii) above shall expire after one hundred eighty (180) **Days**, at which time the requirements of Article 5.4.3(a) shall be in full force and effect unless the **City Agency** renews the finding, in writing, and the DEP Commissioner approves such finding, in writing, or the DEP Commissioner renews the waiver, in writing.

5.4.3(e) The requirements of this Article 5.4.3 do not apply where they are precluded by federal or State funding requirements or where the **Contract** is an emergency procurement.

5.4.4 Section 24-163 of the Administrative Code. The **Contractor** shall comply with Section 24-163 of the Administrative Code related to the idling of the engines of motor vehicles while parking.

5.4.5 Compliance

5.4.5(a) The **Contractor's** compliance with Article 5.4 may be independently monitored. If it is determined that the **Contractor** has failed to comply with any provision of Article 5.4, any costs associated with any independent monitoring incurred by the **City** shall be reimbursed by the **Contractor**.

5.4.5(b) Any **Contractor** who violates any provision of Article 5.4, except as provided in Article 5.4.5(c) below, shall be liable for a civil penalty between the amounts of one thousand ($1,000) and ten thousand ($10,000) dollars, in addition to twice the amount of money saved by such **Contractor** for failure to comply with Article 5.4.

5.4.5(c) No **Contractor** shall make a false claim with respect to the provisions of Article 5.4 to a **City Agency**. Where a **Contractor** has been found to have done so, such **Contractor** shall be liable for a civil penalty of twenty thousand ($20,000) dollars, in addition to twice the amount of money saved by such **Contractor** in association with having made such false claim.

5.4.6 Reporting

5.4.6(a) For all Public Works Contracts covered by this Article 5.4, the **Contractor** shall report to the **City Agency** the following information:

5.4.6(a)(i) The total number of diesel-powered Nonroad Vehicles used to fulfill the requirements of this Public Works Contract;

5.4.6(a)(ii) The number of such Nonroad Vehicles that were powered by Ultra Low Sulfur Diesel Fuel;

5.4.6(a)(iii) The number of such Nonroad Vehicles that utilized the best available technology for reducing the emission of pollutants, including a breakdown by vehicle model and the type of technology;

5.4.6(a)(iv) The number of such Nonroad Vehicles that utilized such other authorized technology in accordance with Article 5.4.3, including a breakdown by vehicle model and the type of technology used for each such vehicle;

5.4.6(a)(v) The locations where such Nonroad Vehicles were used; and

5.4.6(a)(vi) Where a determination is in effect pursuant to Article 5.4.2(b) or 5.4.2(c), detailed information concerning the **Contractor's** efforts to obtain Ultra Low Sulfur Diesel Fuel or diesel fuel that has a sulfur content of no more than thirty parts per million (30 ppm).

5.4.6(b) The **Contractor** shall submit the information required by Article 5.4.6(a) at the completion of **Work** under the Public Works Contract and on a yearly basis no later than August 1 throughout the term of the Public Works Contract. The yearly report shall cover **Work** performed during the preceding fiscal year (July 1 - June 30).

5.5 Ultra Low Sulfur Diesel Fuel. In accordance with the Coordinated Construction Act for Lower Manhattan, as amended:

5.5.1 Definitions. For purposes of this Article 5.5, the following definitions apply:

5.5.1(a) "Lower Manhattan" means the area to the south of and within the following lines: a line beginning at a point where the United States pierhead line in the Hudson River as it exists now or may be extended would intersect with the southerly line of West Houston Street in the Borough of Manhattan extended, thence easterly along the southerly side of West Houston Street to the southerly side of Houston Street, thence easterly along the southerly side of Houston Street to the southerly side of East Houston Street, thence northeasterly along the southerly side of East Houston Street to the point where it would intersect with the United States pierhead line in the East River as it exists now or may be extended, including tax lots within or immediately adjacent thereto.

5.5.1(b) "Lower Manhattan Redevelopment Project" means any project in Lower Manhattan that is funded in whole or in part with federal or State funding, or any project intended to improve transportation between Lower Manhattan and the two air terminals in the **City** known as LaGuardia Airport and John F. Kennedy International Airport, or between Lower Manhattan and the air terminal in Newark known as Newark Liberty International Airport, and that is funded in whole or in part with federal funding.

5.5.1(c) "Nonroad Engine" means an internal combustion engine (including the fuel system) that is not used in a Motor Vehicle or a vehicle used solely for competition, or that is not subject to standards promulgated under Section 7411 or Section 7521 of Title 42 of the United States Code, except that this term shall apply to internal combustion engines used to power generators, compressors or similar equipment used in any construction program or project.

5.5.1(d) "Nonroad Vehicle" means a vehicle that is powered by a Nonroad Engine, fifty (50) horsepower (HP) and greater, and that is not a Motor Vehicle or a vehicle used

solely for competition, which shall include, but not be limited to, excavators, backhoes, cranes, compressors, generators, bulldozers, and similar equipment, except that this terms shall not apply to horticultural maintenance vehicles used for landscaping purposes that are powered by a Nonroad Engine of sixty-five (65) HP or less and that are not used in any construction program or project.

5.5.1(e) "Ultra Low Sulfur Diesel Fuel" means diesel fuel that has a sulfur content of no more than fifteen parts per million (15 ppm).

5.5.2 Requirements. **Contractors** and **Subcontractors** are required to use only Ultra Low Sulfur Diesel Fuel to power the diesel-powered Nonroad Vehicles with engine HP rating of fifty (50) HP and above used on a Lower Manhattan Redevelopment Project and, where practicable, to reduce the emission of pollutants by retrofitting such Nonroad Vehicles with oxidation catalysts, particulate filters, or technology that achieves lowest particulate matter emissions.

5.6 Pesticides. In accordance with Section 17-1209 of the Administrative Code, to the extent that the **Contractor** or any **Subcontractor** applies pesticides to any property owned or leased by the **City**, the **Contractor,** and any **Subcontractor** shall comply with Chapter 12 of the Administrative Code.

5.7 Waste Treatment, Storage, and Disposal Facilities and Transporters. In connection withthe **Work**, the **Contractor** and any **Subcontractor** shall use only those waste treatment, storage, and disposal facilities and waste transporters that possess the requisite license, permit or other governmental approval necessary to treat, store, dispose, or transport the waste, materials or hazardous substances.

5.8 Environmentally Preferable Purchasing. The **Contractor** shall ensure that products purchased or leased by the **Contractor** or any **Subcontractor** for the **Work** that are not specified by the **City** or are submitted as equivalents to a product specified by the **City** comply with the requirements of the New York City Environmentally Preferable Purchasing Program contained in Chapter 11 of Title 43 of the RCNY, pursuant to Chapter 3 of Title 6 of the Administrative Code.

ARTICLE 6. INSPECTION

6.1 During the progress of the **Work** and up to the date of **Final Acceptance**, the **Contractor** shall at all times afford the representatives of the **City** every reasonable, safe, and proper facility for inspecting all **Work** done or being done at the **Site** and also for inspecting the manufacture or preparation of materials and equipment at the place of such manufacture or preparation.

6.2 The **Contractor's** obligation hereunder shall include the uncovering or taking down of finished **Work** and its restoration thereafter; provided, however, that the order to uncover, take down and restore shall be in writing, and further provided that if **Work** thus exposed proves satisfactory, and if the **Contractor** has complied with Article 6.1, such uncovering or taking down and restoration shall be considered an item of **Extra Work** to be paid for in accordance with the provisions of Article 26. If the **Work** thus exposed proves unsatisfactory, the **City** has no obligation to compensate the **Contractor** for the uncovering, taking down or restoration.

6.3 Inspection and approval by the **Commissioner**, the **Engineer**, **Project Manager**, or **Resident Engineer**, of finished **Work** or of **Work** being performed, or of materials and equipment at the place of manufacture or preparation, shall not relieve the **Contractor** of its obligation to perform the **Work** in strict accordance with the **Contract**. Finished or unfinished **Work** not found to be in strict accordance with the

Contract shall be replaced as directed by the **Engineer**, even though such **Work** may have been previously approved and paid for. Such corrective **Work** is **Contract Work** and shall not be deemed **Extra Work**.

6.4 Rejected **Work** and materials shall be promptly taken down and removed from the **Site**, which must at all times be kept in a reasonably clean and neat condition.

ARTICLE 7. PROTECTION OF WORK AND OF PERSONS AND PROPERTY; NOTICESAND INDEMNIFICATION

7.1 During the performance of the **Work** and up to the date of **Final Acceptance**, the **Contractor** shall be under an absolute obligation to protect the finished and unfinished **Work** against any damage, loss, injury, theft and/or vandalism and in the event of such damage, loss, injury, theft and/or vandalism,it shall promptly replace and/or repair such **Work** at the **Contractor's** sole cost and expense, as directed by the **Resident Engineer**. The obligation to deliver finished **Work** in strict accordance with the **Contract** prior to **Final Acceptance** shall be absolute and shall not be affected by the **Resident Engineer's** approval of, or failure to prohibit, the **Means and Methods of Construction** used by the **Contractor**.

7.2 During the performance of the **Work** and up to the date of **Final Acceptance**, the **Contractor** shall take all reasonable precautions to protect all persons and the property of the **City** and of others from damage, loss or injury resulting from the **Contractor's**, and/or its **Subcontractors'** operations under this **Contract.** The **Contractor's** obligation to protect shall include the duty to provide, place or replace, and adequately maintain at or about the **Site** suitable and sufficient protection such as lights, barricades, and enclosures.

7.3 The **Contractor** shall comply with the notification requirements set forth below in the event of any loss, damage or injury to **Work**, persons or property, or any accidents arising out of the operations of the **Contractor** and/or its **Subcontractors** under this **Contract**.

7.3.1 The **Contractor** shall make a full and complete report in writing to the **Resident Engineer** within three (3) **Days** after the occurrence.

7.3.2 The **Contractor** shall also send written notice of any such event to all insurance carriers that issued potentially responsive policies (including commercial general liability insurance carriers for events relating to the **Contractor**'s own employees) no later than twenty (20) days after such event and again no later than twenty (20) days after the initiation of any claim and/or action resulting therefrom. Such notice shall contain the following information: the number of the insurance policy, the name of the Named Insured, the date and location of the incident, and the identity of the persons injured or property damaged. For any policy on which the **City** and/or the **Engineer**, **Architect**, or **Project Manager** are Additional Insureds, such notice shall expressly specify that "this notice is being given on behalf of the City of New York as Additional Insured, such other AdditionalInsureds, as well as the Named Insured."

7.3.2(a) Whenever such notice is sent under a policy on which the **City** is an Additional Insured, the **Contractor** shall provide copies of the notice to the **Comptroller,** the **Commissioner** and the **City** Corporation Counsel. The copy to the **Comptroller** shall be sent to the Insurance Unit, NYC Comptroller's Office, 1 Centre Street – Room 1222, New York, New York, 10007. The copy to the **Commissioner** shall be sent to the address set forth in Schedule A of the General Conditions. The copy to the **City** Corporation Counsel shall be sent to Insurance Claims Specialist, Affirmative Litigation

Division, New York City Law Department, 100 Church Street, New York, New York 10007.

7.3.2(b) If the **Contractor** fails to provide any of the foregoing notices to anyappropriate insurance carrier(s) in a timely and complete manner, the **Contractor**shall indemnify the **City** for all losses, judgments, settlements, and expenses, including reasonable attorneys' fees, arising from an insurer's disclaimer of coverage citing late notice by or on behalf of the **City**.

7.4 To the fullest extent permitted by law, the **Contractor** shall defend, indemnify, and hold the **City**, its employees, and officials (the "Indemnitees") harmless against any and all claims (including but not limited to claims asserted by any employee of the **Contractor** and/or its **Subcontractors**) and costs and expenses of whatever kind (including but not limited to payment or reimbursement of attorneys' fees and disbursements) allegedly arising out of or in any way related to the operations of the **Contractor** and/or its **Subcontractors** in the performance of this **Contract** or from the **Contractor's** and/or its **Subcontractors'** failure to comply with any of the provisions of this **Contract** or of the **Law**. Such costs and expenses shall include all those incurred in defending the underlying claim and those incurred in connection with the enforcement of this Article 7.4 by way of cross-claim, third-party claim, declaratory action or otherwise. The parties expressly agree that the indemnification obligation hereunder contemplates (1) full indemnity in the event of liability imposed against the Indemnitees without negligence and solely by reason of statute, operation of **Law** or otherwise; and (2) partial indemnity in the event of any actual negligence on the part of the Indemnitees either causing orcontributing to the underlying claim (in which case, indemnification will be limited to any liability imposed over and above that percentage attributable to actual fault whether by statute, by operation of **Law**, or otherwise). Where partial indemnity is provided hereunder, all costs and expenses shall be indemnified on a pro rata basis.

7.4.1 Indemnification under Article 7.4 or any other provision of the **Contract** shall operate whether or not **Contractor** or its **Subcontractors** have placed and maintained the insurance specified under Article 22.

7.5 The provisions of this Article 7 shall not be deemed to create any new right of action in favor of third parties against the **Contractor** or the **City**.

CHAPTER III: TIME PROVISIONS

ARTICLE 8. COMMENCEMENT AND PROSECUTION OF THE WORK

8.1 The **Contractor** shall commence the **Work** on the date specified in the **Notice to Proceed** or the **Order to Work**. The time for performance of the **Work** under the **Contract** shall be computed from the date specified in the **Notice to Proceed** or the **Order to Work**. **TIME BEING OF THE ESSENCE** to the **City**, the **Contractor** shall thereafter prosecute the **Work** diligently, using such **Means and Methods of Construction** as are in accord with Article 4 herein and as will assure its completion not later than the date specified in this Contract, or on the date to which the time for completion may be extended.

ARTICLE 9. PROGRESS SCHEDULES

9.1 To enable the **Work** to be performed in an orderly and expeditious manner, the **Contractor**, within fifteen (15) **Days** after the **Notice to Proceed** or **Order to Work**, unless otherwise directed by the **Engineer**, shall submit to the **Engineer** a proposed progress schedule based on the Critical Path Methodin the form of

a bar graph or in such other form as specified by the **Engineer**, and monthly cash flow requirements, showing:

9.1.1 The anticipated time of commencement and completion of each of the variousoperations to be performed under this **Contract**; and

9.1.2 The sequence and interrelation of each of these operations with the others and with those of other related contracts; and

9.1.3 The estimated time required for fabrication or delivery, or both, of all materials and equipment required for the **Work**, including the anticipated time for obtaining required approvals pursuant to Article 10; and

9.1.4 The estimated amount in dollars the **Contractor** will claim on a monthly basis.

9.2 The proposed schedule shall be revised as directed by the **Engineer**, until finally approved by the **Engineer**, and after such approval, subject to the provisions of Article 11, shall be strictly adhered to by the **Contractor**.

9.3 If the **Contractor** shall fail to adhere to the approved progress schedule, or to the schedule as revised pursuant to Article 11, it shall promptly adopt such other or additional **Means and Methods of Construction**, at its sole cost and expense, as will make up for the time lost and will assure completion in accordance with the approved progress schedule. The approval by the **City** of a progress schedule which is shorter than the time allotted under the **Contract** shall not create any liability for the **City** if the approved progress schedule is not met.

9.4 The **Contractor** will not receive any payments until the proposed progress schedule is submitted.

ARTICLE 10. REQUESTS FOR INFORMATION OR APPROVAL

10.1 From time to time as the **Work** progresses and in the sequence indicated by the approved progress schedule, the **Contractor** shall submit to the **Engineer** a specific request in writing for each item of information or approval required by the **Contractor**. These requests shall state the latest date upon which the information or approval is actually required by the **Contractor**, and shall be submitted in a reasonable time in advance thereof to provide the **Engineer** a sufficient time to act upon such submissions, or any necessary re-submissions thereof.

10.2 The **Contractor** shall not have any right to an extension of time on account of delays due to the **Contractor's** failure to submit requests for the required information or the required approval in accordance with the above requirements.

ARTICLE 11. NOTICE OF CONDITIONS CAUSING DELAY AND DOCUMENTATION OF DAMAGES CAUSED BY DELAY

11.1 After the commencement of any condition which is causing or may cause a delay in completion of the **Work**, including conditions for which the **Contractor** may be entitled to an extension of time, the following notifications and submittals are required:

11.1.1 Within fifteen (15) **Days** after the **Contractor** becomes aware or reasonably should be

aware of each such condition, the **Contractor** must notify the **Resident Engineer** or **Engineer**, as directed by the **Commissioner**, in writing of the existence, nature and effect of such condition upon the approved progress schedule and the **Work**, and must state why and in what respects, if any, the condition is causing or may cause a delay. Such notice shall include a description of the construction activities that are or could be affected by the condition and may include any recommendations the **Contractor** may have to address the delay condition and any activities the **Contractor** may take to avoid or minimize the delay.

11.1.2 If the **Contractor** shall claim to be sustaining damages for delay as provided for in this Article 11,within forty-five (45) **Days** from the time such damages are first incurred for each such condition, the **Contractor** shall submit to the **Commissioner** a verified written statement of the details and estimates of the amounts of such damages, including categories of expected damages and projected monthly costs, together with documentary evidence of such damages as the **Contractor** may have at the time of submission ("statement of delay damages"), as further detailed in Article 11.6. The **Contractor** may submit the above statement within such additional time as may be granted by the **Commissioner** in writing upon written request therefor.

11.1.3 Articles 11.1.1 and 11.1.2 do not relieve the **Contractor** of its obligation to comply with the provisions of Article 44.

11.2 Failure of the **Contractor** to strictly comply with the requirements of Article 11.1.1 may, inthe discretion of the **Commissioner**, be deemed sufficient cause to deny any extension of time on account of delay arising out of such condition. Failure of the **Contractor** to strictly comply with the requirements of both Articles 11.1.1 and 11.1.2 shall be deemed a conclusive waiver by the **Contractor** of any and all claims for damages for delay arising from such condition and no right to recover on such claims shall exist.

11.3 When appropriate and directed by the **Engineer**, the progress schedule shall be revised by the **Contractor** until finally approved by the **Engineer**. The revised progress schedule must be strictly adhered to by the **Contractor**.

11.4 Compensable Delays

11.4.1 The **Contractor** agrees to make claim only for additional costs attributable to delayin the performance of this **Contrac**t necessarily extending the time for completion of the **Work** or resulting from acceleration directed by the **Commissioner** and required to maintain the progress schedule, occasioned solely by any act or omission to act of the **City** listed below. The **Contractor** also agrees that delay from any other cause shall be compensated, if at all, solely by an extension of time to complete the performance of the **Work**.

11.4.1.1 The failure of the **City** to take reasonable measures to coordinate and progress the **Work** to the extent required by the **Contract**, except that the City shall not be responsible for the **Contractor's** obligation to coordinate and progress the **Work** of its **Subcontractors**.

11.4.1.2 Unreasonable delays attributable to the review of shop drawings, the issuance of change orders, or the cumulative impact of change orders that were not brought about by any act or omission of the **Contractor**.

11.4.1.3 The unavailability of the **Site** caused by acts or omissions of the **City**..

11.4.1.4 The issuance by the **Engineer** of a stop work order that was not brought about through any act or omission of the **Contractor**.

11.4.1.5 Differing site conditions or environmental hazards that were neitherknown nor reasonably ascertainable on a pre-bid inspection of the **Site**or review

of the bid documents or other publicly available sources, and that are not ordinarily encountered in the **Project**'s geographical area or neighborhood or in the type of **Work** to be performed.

11.4.1.6 Delays caused by the **City's** bad faith or its willful, malicious, or grossly negligent conduct;

11.4.1.7 Delays not contemplated by the parties;

11.4.1.8 Delays so unreasonable that they constitute an intentional abandonment of the **Contract** by the **City**; and

11.4.1.9 Delays resulting from the **City's** breach of a fundamental obligation of the **Contract**.

11.4.2 No claim may be made for any alleged delay in **Substantial Completion** of the **Work** if the **Work** will be or is substantially completed by the date of **Substantial Completion** provided for in Schedule A unless acceleration has been directed by the **Commissioner** to meet the date of **Substantial Completion** set forth in Schedule A, or unless there is a provision in the **Contract** providing for additional compensation for early completion.

11.4.3 The provisions of this Article 11 apply only to claims for additional costs attributable to delay and do not preclude determinations by the **Commissioner** allowing reimbursements for additional costs for **Extra Work** pursuant to Articles 25 and 26 of this **Contract**. To the extent that any cost attributable to delay is reimbursed as part of a change order, no additional claim for compensation under this Article 11 shall be allowed.

11.5 Non-Compensable Delays. The **Contractor** agrees to make no claim for, and is deemed to have included in its bid prices for the various items of the **Contract**, the extra/additional costs attributable to any delays caused by or attributable to the items set forth below. For such items, the **Contractor** shall be compensated, if at all, solely by an extension of time to complete the performance of the **Work**, in accordance with the provisions of Article 13. Such extensions of time will be granted, if at all, pursuant to the grounds set forth in Article 13.3.

11.5.1 The acts or omissions of any third parties, including but not limited to **Other Contractors**, public/ governmental bodies (other than **City Agencies**), utilities or private enterprises, who are disclosed in the **Contract Documents** or are ordinarily encountered or generally recognized as related to the **Work**;

11.5.2 Any situation which was within the contemplation of the parties at the time of entering into the **Contract**, including any delay indicated or disclosed in the **Contract Documents** or that would be generally recognized by a reasonably prudent contractor as related to the nature of the **Work**, and/or the existence of any facility or appurtenance owned, operated or maintained by any third party, as indicated or disclosed in the **Contract Documents** or ordinarily encountered or generally recognized as related to the nature of the **Work**;

11.5.3 Restraining orders, injunctions or judgments issued by a court which were caused by a Contractor's submission, action or inaction or by a Contractor's **Means and Methods of Construction**, or by third parties, unless such order, injunction or judgment was the result of an act or omission by the **City**;

11.5.4 Any labor boycott, strike, picketing, lockout or similar situation;

11.5.5 Any shortages of supplies or materials, or unavailability of equipment, required by the **Contract Work**;

11.5.6 Climatic conditions, storms, floods, droughts, tidal waves, fires, hurricanes, earthquakes, landslides or other catastrophes or acts of God, or acts of war or of the public enemy or terrorist acts, including the **City's** reasonable responses thereto; and

11.5.7 **Extra Work** which does not significantly affect the overall completion of the **Contract**, reasonable delays in the review or issuance of change orders or field orders and/or in shop drawing reviews or approvals.

11.6 Required Content of Submission of Statement of Delay Damages

11.6.1 In the verified written statement of delay damages required by Article 11.1.2, the following information shall be provided by the **Contractor**:

11.6.1.1 For each delay, the start and end dates of the claimed periods of delay and, in addition, a description of the operations that were delayed, an explanation of how they were delayed, and the reasons for the delay, including identifying the applicable act or omission of the City listed in Article 11.4.

11.6.1.2 A detailed factual statement of the claim providing all necessary dates, locations and items of **Work** affected by the claim.

11.6.1.3 The estimated amount of additional compensation sought and a breakdown of that amount into categories as described in Article 11.7.

11.6.1.4 Any additional information requested by the **Commissioner**.

11.7 Recoverable Costs

11.7.1 Delay damages may be recoverable for the following costs actually and necessarily incurred in the performance of the **Work**:

11.7.1.1 Direct labor, including payroll taxes (subject to statutory wage caps) and supplemental benefits, based on time and materials records;

11.7.1.2 Necessary materials (including transportation to the **Site**), based on time and material records;

11.7.1.3 Reasonable rental value of necessary plant and equipment other than small tools, plus fuel/energy costs according to the applicable formula set forth in Articles 26.2.4 and/or 26.2.8, based on time and material records;

11.7.1.4 Additional insurance and bond costs;

11.7.1.5 Extended **Site** overhead, field office rental, salaries of field office staff, on-site project managers and superintendents, field office staff vehicles, **Project-**specific storage, field office utilities and telephone, and field office consumables;

11.7.1.6 Labor escalation costs based on actual costs;

11.7.1.7 Materials and equipment escalation costs based on applicable industry indices unless documentation of actual increased cost is provided;

11.7.1.8 Additional material and equipment storage costs based on actual documented costs and additional costs necessitated by extended manufacturer warranty periods; and

11.7.1.9 Extended home office overhead calculated based on the following formula:

(1) Subtract from the original **Contract** amount the amount earned by original contractual **Substantial Completion** date (not

including change orders);

(2) Remove 15% overhead and profit from the calculation in item (1) by dividing the results of item (1) by 1.15;

(3) Multiply the result of item (2) by 7.25% for the total home office overhead;

(4) Multiply the result of item (3) by 7.25% for the total profit; and

(5) The total extended home office overhead will be the total of items (3) and (4).

11.7.2 Recoverable Subcontractor Costs. When the **Work** is performed by a **Subcontractor**, the **Contractor** may be paid the actual and necessary costs of such subcontracted **Work** as outlined above in Articles 11.7.1.1 through 11.7.1.8, and an additional overhead of 5% of the costs outlined in Articles 11.7.1.1 through 11.7.1.3.

11.7.3 Non-Recoverable Costs. The parties agree that the **City** will have no liability for the following items and the **Contractor** agrees it shall make no claim for the following items:

11.7.3.1 Profit, or loss of anticipated or unanticipated profit, except as provided in Article 11.7.1.9;

11.7.3.2 Consequential damages, including, but not limited to, construction or bridge loans or interest paid on such loans, loss of bonding capacity, bidding opportunities, or interest in investment, or any resulting insolvency;

11.7.3.3 Indirect costs or expenses of any nature except those included in Article 11.7.1;

11.7.3.4 Direct or indirect costs attributable to performance of **Work** where the **Contractor**, because of situations or conditions within its control, hasnot progressed the **Work** in a satisfactory manner; and

11.7.3.5 Attorneys' fees and dispute and claims preparation expenses.

11.8 Any claims for delay under this Article 11 are not subject to the jurisdiction of the Contract Dispute Resolution Board pursuant to the dispute resolution process set forth in Article 27.

11.9 Any compensation provided to the **Contractor** in accordance with this Article 11 will be made pursuant to a claim filed with the **Comptroller**. Nothing in this Article 11 extendsthe time for the **Contractor** to file an action with respect to a claim within six months after **Substantial Completion** pursuant to Article 56.

ARTICLE 12. COORDINATION WITH OTHER CONTRACTORS

12.1 During the progress of the **Work**, **Other Contractors** may be engaged in performing other work or may be awarded other contracts for additional work on this **Project**. In that event, the **Contractor** shall coordinate the **Work** to be done hereunder with the work of such **Other Contractors** and the **Contractor** shall fully cooperate with such **Other Contractors** and carefully fit its own **Work** to that provided under other contracts as may be directed by the **Engineer**. The **Contractor** shall not commit or permit any act which will interfere with the performance of work by any **Other Contractors**.

12.2 If the **Engineer** determines that the **Contractor** is failing to coordinate its **Work** with the work of **Other Contractors** as the **Engineer** has directed, then the **Commissioner** shall have the right to withhold any payments otherwise due hereunder until the **Contractor** completely complies with the **Engineer's** directions.

12.3 The **Contractor** shall notify the **Engineer** in writing if any **Other Contractor** on this **Project** is failing to coordinate its work with the **Work** of this **Contract**. If the **Engineer** finds such charges to be true, the **Engineer** shall promptly issue such directions to the **Other Contractor** with respect thereto as the situation may require. The **City** shall not, however, be liable for any damages suffered by any **Other Contractor's** failure to coordinate its work with the **Work** of this **Contract** or by reason of the **Other Contractor's** failure to promptly comply with the directions so issued by the **Engineer**, or by reason of any **Other Contractor's** default in performance, it being understood that the **City** does not guarantee the responsibility or continued efficiency of any contractor. The **Contractor** agrees to make no claim against the **City** for any damages relating to or arising out of any directions issued by the **Engineer** pursuant to this Article 12 (including but not limited to the failure of any **Other Contractor** to comply or promptly comply with such directions), or the failure of any **Other Contractor** to coordinate its work, or the default in performance of any **Other Contractor**.

12.4 The **Contractor** shall indemnify and hold the **City** harmless from any and all claims or judgments for damages and from costs and expenses to which the **City** may be subjected or which it may suffer or incur by reason of the **Contractor's** failure to comply with the **Engineer's** directions promptly; and the **Comptroller** shall have the right to exercise the powers reserved in Article 23 with respect to any claims which may be made for damages due to the **Contractor's** failure to comply with the **Engineer's** directions promptly. Insofar as the facts and **Law** relating to any claim would preclude the **City** from being completely indemnified by the **Contractor**, the **City** shall be partially indemnified by the **Contractor** to the fullest extent provided by **Law**.

12.5 Should the **Contractor** sustain any damage through any act or omission of any **Other Contractor** having a contract with the **City** for the performance of work upon the **Site** or of work which may be necessary to be performed for the proper prosecution of the **Work** to be performed hereunder, or through any act or omission of a subcontractor of such **Other Contractor**, the **Contractor** shall have no claim against the **City** for such damage, but shall have a right to recover such damage from the **Other**
12.5 **Contractor** under the provision similar to the following provisions which apply to this Contract and have been or will be inserted in the contracts with such Other Contractors:

> 12.5.1 Should any **Other Contractor** having or who shall hereafter have a contract with the **City** for the performance of work upon the **Site** sustain any damage through any act or omission of the **Contractor** hereunder or through any act or omission of any **Subcontractor** of the **Contractor**, the **Contractor** agrees to reimburse such **Other Contractor** for all such damages and to defend at its own expense any action based upon such claim and if any judgment or claim (even if the allegations of the action are without merit) against the **City** shall be allowed the **Contractor** shall pay or satisfy such judgment or claim and pay all costs and expenses in connection therewith and agrees to indemnify and hold the **City** harmless from all such claims. Insofar as the facts and **Law** relating to any claim would preclude the **City** from being completely indemnified by the **Contractor**, the **City** shall be partially indemnified by the **Contractor** to the fullest extent provided by **Law**.

12.6 The **City's** right to indemnification hereunder shall in no way be diminished, waived or discharged by its recourse to assessment of liquidated damages as provided in Article 15, or by the exercise of any other remedy provided for by **Contract** or by **Law**.

ARTICLE 13. EXTENSION OF TIME FOR PERFORMANCE

13.1 If performance by the **Contractor** is delayed for a reason set forth in Article 13.3, the **Contractor** may be allowed a reasonable extension of time in conformance with this Article 13 and the **PPB**

Rules.

13.2 Any extension of time may be granted only by the **ACCO** or by the Board for the Extension of Time (hereafter "Board") (as set forth below) upon written application by the **Contractor**.

13.3 Grounds for Extension: If such application is made, the **Contractor** shall be entitled to an extension of time for delay in completion of the **Work** caused solely:

13.3.1 By the acts or omissions of the **City**, its officials, agents or employees; or

13.3.2 By the act or omissions of **Other Contractors** on this **Project**; or

13.3.3 By supervening conditions entirely beyond the control of either party hereto (such as, but not limited to, acts of God or the public enemy, excessive inclement weather, war or other national emergency making performance temporarily impossible or illegal, or strikes or labor disputes not brought about by any act or omission of the **Contractor**).

13.3.4 The **Contractor** shall, however, be entitled to an extension of time for such causes only for the number of **Days** of delay which the **ACCO** or the Board may determine to be due solely to such causes, and then only if the **Contractor** shall have strictly complied with all of the requirements of Articles 9 and 10.

13.4 The **Contractor** shall not be entitled to receive a separate extension of time for each of several causes of delay operating concurrently, but, if at all, only for the actual period of delay in completion of the **Work** as determined by the **ACCO** or the Board, irrespective of the number of causes contributing to produce such delay. If one of several causes of delay operating concurrently results from any act, fault or omission of the **Contractor** or of its **Subcontractors** or **Materialmen**, and would of itself (irrespective of the concurrent causes) have delayed the **Work**, no extension of time will be allowed for the period ofdelay resulting from such act, fault or omission.

13.5 The determination made by the **ACCO** or the Board on an application for an extension of time shall be binding and conclusive on the **Contractor**.

13.6 The **ACCO** or the Board acting entirely within their discretion may grant an application for an extension of time for causes of delay other than those herein referred.

13.7 Permitting the **Contractor** to continue with the **Work** after the time fixed for its completion has expired, or after the time to which such completion may have been extended has expired, or the making of any payment to the **Contractor** after such time, shall in no way operate as a waiver on the part of the **City** of any of its rights under this **Contract**.

13.8 Application for Extension of Time:

13.8.1 Before the **Contractor's** time extension request will be considered, the **Contractor** shall notify the **ACCO** of the condition which allegedly has caused or is causing the delay, and shall submit a written application to the **ACCO** identifying:

13.8.1(a) The **Contractor**; the registration number; and **Project** description;

13.8.1(b) Liquidated damage assessment rate, as specified in the **Contract**;

13.8.1(c) Original total bid price;

13.8.1(d) The original **Contract** start date and completion date;

13.8.1(e) Any previous time extensions granted (number and duration); and

13.8.1(f) The extension of time requested.

13.8.2 In addition, the application for extension of time shall set forth in detail:

13.8.2(a) The nature of each alleged cause of delay in completing the **Work**;

13.8.2(b) The date upon which each such cause of delay began and ended and the number of **Days** attributable to each such cause;

13.8.2(c) A statement that the **Contractor** waives all claims except for those delineated in the application, and the particulars of any claims which the **Contractor** does not agree to waive. For time extensions for **Substantial Completion** and final completion payments, the application shall include a detailed statement of the dollar amounts of each element of claim item reserved; and

13.8.2(d) A statement indicating the **Contractor's** understanding that the time extension is granted only for purposes of permitting continuation of **Contract** performance and payment for **Work** performed and that the **City** retains its right to conduct an investigation and assess liquidated damages as appropriate in the future.

13.9 Analysis and Approval of Time Extensions:

13.9.1 For time extensions for partial payments, a written determination shall be made by the **ACCO** who may, for good and sufficient cause, extend the time for the performance of the **Contract** as follows:

13.9.1(a) If the **Work** is to be completed within six (6) months, the time for performance may be extended for sixty (60) **Days**;

13.9.1(b) If the **Work** is to be completed within less than one (1) year but more than six (6) months, an extension of ninety (90) **Days** may be granted;

13.9.1(c) If the **Contract** period exceeds one (1) year, besides the extension granted in Article 13.9.1(b), an additional thirty (30) **Days** may be granted for each multipleof six (6) months involved beyond the one (1) year period; or

13.9.1(d) If exceptional circumstances exist, the **ACCO** may extend the time for performance beyond the extensions in Articles 13.9.1(a), 13.9.1(b), and 13.9.1(c). In that event, the **ACCO** shall file with the Mayor's Office of Contract Services a written explanation of the exceptional circumstances.

13.9.2 For extensions of time for **Substantial Completion** and final completion payments, the **Engineer**, in consultation with the **ACCO**, shall prepare a written analysis of the delay (including a preliminary determination of the causes of delay, the beginning and end dates for each such cause of delay, and whether the delays are excusable under the terms of this **Contract**). The report shall be subject to review by and approval of the Board, which shall have authority to question its analysis and determinations and request additional facts or documentation. The report as reviewed and made final by the Board shall be made a part of the **Agency** contract file. Neither the report itself nor anything contained therein shall operate as a

waiver or release of any claim the **City** may have against the **Contractor** for either actual or liquidated damages.

13.9.3 Approval Mechanism for Time Extensions for **Substantial Completion** or Final Completion Payments: An extension shall be granted only with the approval of the Board which is comprised of the **ACCO** of the **Agency**, the **City** Corporation Counsel, and the **Comptroller**, or their authorized representatives.

13.9.4 Neither the granting of any application for an extension of time to the **Contractor** or any **Other Contractor** on this **Project** nor the papers, records or reports related to any application for or grant of an extension of time or determination related thereto shall be referred to or offered in evidence by the **Contractor** or its attorneys in any action or proceeding.

13.10 No Damage for Delay: The **Contractor** agrees to make no claim for damages for delay in the performance of this **Contract** occasioned by any act or omission to act of the **City** or any of its representatives, except as provided for in Article 11.

ARTICLE 14. COMPLETION AND FINAL ACCEPTANCE OF THE WORK

14.1 Date for **Substantial Completion**: The **Contractor** shall substantially complete the **Work** within the time fixed in Schedule A of the General Conditions, or within the time to which such **Substantial Completion** may be extended.

14.2 Determining the Date of **Substantial Completion**: The **Work** will be deemed to be substantially complete when the two conditions set forth below have been met.

14.2.1 Inspection: The **Engineer** or **Resident Engineer**, as applicable, has inspected the **Work** and has made a written determination that it is substantially complete.

14.2.2 Approval of **Final Approved Punch List** and Date for **Final Acceptance**: Following inspection of the **Work**, the **Engineer/Resident Engineer** shall furnish the **Contractor** with a final punch list, specifying all items of **Work** to be completed and proposing dates for the completion of each specified item of **Work**. The **Contractor** shall then submit in writing to the **Engineer/Resident Engineer** within ten (10) **Days** of the **Engineer/Resident Engineer** furnishing the final punch list either acceptance of the dates or proposed alternative dates for the completion of each specified item of **Work**. If the **Contractor** neither accepts the dates nor proposes alternative dates within ten (10) **Days**, the schedule proposed by the **Engineer/Resident Engineer** shall be deemed accepted. If the **Contractor** proposes alternative dates, then, within a reasonable time after receipt, the **Engineer/Resident Engineer**, in a written notification to the **Contractor**, shall approve the **Contractor's** completion dates or, if they are unable to agree, the **Engineer/Resident Engineer** shall establish dates for the completion of each item of **Work**. The latest completion date specified shall be the date for **Final Acceptance** of the **Work**.

14.3 Date of **Substantial Completion**. The date of approval of the **Final Approved Punch List**, shall be the date of **Substantial Completion**. The date of approval of the **Final Approved Punch List** shall be either (a) if the **Contractor** approves the final punch list and proposed dates for completion furnished by the **Engineer/Resident Engineer**, the date of the **Contractor**'s approval; or (b) if the **Contractor** neither accepts the dates nor proposes alternative dates, ten (10) **Days** after the **Engineer/Resident Engineer** furnishes the **Contractor** with a final punch list and proposed dates for completion; or (c) if the **Contractor** proposes alternative dates, the date that the **Engineer/Resident Engineer** sends written notification to the

Contractor either approving the **Contractor**'s proposed alternative dates or establishing dates for the completion for each item of **Work**.

14.4 Determining the Date of **Final Acceptance**: The **Work** will be accepted as final and complete as of the date of the **Engineer**'s/**Resident Engineer**'s inspection if, upon such inspection, the **Engineer/Resident Engineer** finds that all items on the **Final Approved Punch List** are complete andno further **Work** remains to be done. The **Commissioner** will then issue a written determination of **Final Acceptance**.

14.5 Request for Inspection: Inspection of the **Work** by the **Engineer/Resident Engineer** for the purpose of **Substantial Completion** or **Final Acceptance** shall be made within fourteen (14) **Days** after receipt of the **Contractor's** written request therefor.

14.6 Request for Re-inspection: If upon inspection for the purpose of **Substantial Completion** or **Final Acceptance**, the **Engineer/Resident Engineer** determines that there are items of **Work** still to be performed, the **Contractor** shall promptly perform them and then request a re-inspection. If upon re-inspection, the **Engineer/Resident Engineer** determines that the **Work** is substantially complete or finally accepted, the date of such re-inspection shall be the date of **Substantial Completion** or **Final Acceptance**. Re-inspection by the **Engineer/Resident Engineer** shall be made within ten (10) **Days** after receipt of the **Contractor's** written request therefor.

14.7 Initiation of Inspection by the **Engineer/Resident Engineer**: If the **Contractor** does not request inspection or re-inspection of the **Work** for the purpose of **Substantial Completion** or **Final Acceptance**, the **Engineer/Resident Engineer** may initiate such inspection or re-inspection.

ARTICLE 15. LIQUIDATED DAMAGES

15.1 In the event the **Contractor** fails to substantially complete the **Work** within the time fixed for such **Substantial Completion** in Schedule A of the General Conditions, plus authorized time extensions, or if the **Contractor**, in the sole determination of the **Commissioner**, has abandoned the **Work**, the **Contractor** shall pay to the **City** the sum fixed in Schedule A of the General Conditions, for each and every **Day** that the time consumed in substantially completing the **Work** exceeds the time allowed therefor; which said sum, in view of the difficulty of accurately ascertaining the loss which the **City** will suffer by reason of delay in the **Substantial Completion** of the **Work** hereunder, is hereby fixed and agreed as the liquidated damages that the **City** will suffer by reason of such delay, and not as a penalty. This Article 15 shall also apply to the **Contractor** whether or not the **Contractor** is defaulted pursuant to Chapter X of this **Contract**. Neither the failure to assess liquidated damages nor the granting of any time extension shall operate as a waiver or release of any claim the **City** may have against the **Contractor** for either actual or liquidated damages.

15.2 Liquidated damages received hereunder are not intended to be nor shall they be treated as either a partial or full waiver or discharge of the **City's** right to indemnification, or the **Contractor's** obligation to indemnify the **City**, or to any other remedy provided for in this **Contract** or by **Law**.

15.3 The **Commissioner** may deduct and retain out of the monies which may become due hereunder, the amount of any such liquidated damages; and in case the amount which may become due hereunder shall be less than the amount of liquidated damages suffered by the **City**, the **Contractor** shall be liable to pay the difference.

ARTICLE 16. OCCUPATION OR USE PRIOR TO COMPLETION

16.1 Unless otherwise provided for in the **Specifications**, the **Commissioner** may take over, use, occupy or operate any part of the **Work** at any time prior to **Final Acceptance**, upon written notification to the **Contractor**. The **Engineer** or **Resident Engineer**, as applicable, shall inspect the part of the**Work** to be taken over, used, occupied, or operated, and will furnish the **Contractor** with a written statement of the **Work**, if any, which remains to be performed on such part. The **Contractor** shall not object to, nor interfere with, the **Commissioner's** decision to exercise the rights granted by Article 16. In the event the **Commissioner** takes over, uses, occupies, or operates any part of the **Work:**

16.1.1 the **Engineer/Resident Engineer** shall issue a written determination of **Substantial Completion** with respect to such part of the **Work**;

16.1.2 the **Contractor** shall be relieved of its absolute obligation to protect such part of the unfinished **Work** in accordance with Article 7;

16.1.3 the **Contractor's** guarantee on such part of the **Work** shall begin on the date of such use by the **City**; and;

16.1.4 the **Contractor** shall be entitled to a return of so much of the amount retained in accordance with Article 21 as it relates to such part of the **Work**, except so much thereof as may be retained under Articles 24 and 44.

CHAPTER IV: SUBCONTRACTS AND ASSIGNMENTS

ARTICLE 17. SUBCONTRACTS

17.1 The **Contractor** shall not make subcontracts totaling an amount more than the percentage of the total **Contract** price fixed in Schedule A of the General Conditions, without prior written permission from the **Commissioner**. All subcontracts made by the **Contractor** shall be in writing. No **Work** may be performed by a **Subcontractor** prior to the **Contractor** entering into a written subcontract with the **Subcontractor** and complying with the provisions of this Article 17.

17.2 Before making any subcontracts, the **Contractor** shall submit a written statement to the **Commissioner** giving the name and address of the proposed **Subcontractor**; the portion of the **Work** and materials which it is to perform and furnish; the cost of the subcontract; the VENDEX questionnaire if required; the proposed subcontract if requested by the **Commissioner**; and any other information tending to prove that the proposed **Subcontractor** has the necessary facilities, skill, integrity, past experience, and financial resources to perform the **Work** in accordance with the terms and conditions of this **Contract**.

17.3 In addition to the requirements in Article 17.2, **Contractor** is required to list the **Subcontractor** in the web based Subcontractor Reporting System through the City's Payee Information Portal (PIP), available at www.nyc.gov/pip.[1]For each **Subcontractor** listed, **Contractor** is required to provide the following information: maximum contract value, description of **Subcontractor's** Work, start and end date of the subcontract and identification of the **Subcontractor**'s industry. Thereafter, **Contractor** will be required to report in the system the payments made to each **Subcontractor** within 30 days of making the

[1] In order to use the new system, a PIP account will be required. Detailed instructions on creating a PIP account and using the new system are also available at www.nyc.gov/pip. Additional assistance with PIP may be obtained by emailing the Financial Information Services Agency Help Desk at pip@fisa.nyc.gov.

payment. If any of the required information changes throughout the Term of the **Contract**, **Contractor** will be required to revise the information in the system.

Failure of the **Contractor** to list a **Subcontractor** and/or to report **Subcontractor** payments in a timely fashion may result in the **Commissioner** declaring the **Contractor** in default of the **Contract** and will subject **Contractor** to liquidated damages in the amount of $100 per day for each day that the **Contractor** fails to identify a **Subcontractor** along with the required information about the **Subcontractor** and/or fails to report payments to a **Subcontractor**, beyond the time frames set forth herein or in the notice from the **City**. Article 15 shall govern the issue of liquidated damages.

17.4 If an approved **Subcontractor** elects to subcontract any portion of its subcontract, the proposed sub-subcontract shall be submitted in the same manner as directed above.

17.5 The **Commissioner** will notify the **Contractor** in writing whether the proposed **Subcontractor** is approved. If the proposed **Subcontractor** is not approved, the **Contractor** may submit another proposed **Subcontractor** unless the **Contractor** decides to do the **Work**. No **Subcontractor** shall be permitted to enter or perform any work on the **Site** unless approved.

17.6 Before entering into any subcontract hereunder, the **Contractor** shall provide the proposed **Subcontractor** with a complete copy of this document and inform the proposed **Subcontractor** fully and completely of all provisions and requirements of this **Contract** relating either directly or indirectly to the **Work** to be performed and the materials to be furnished under such subcontract, and every such **Subcontractor** shall expressly stipulate that all labor performed and materials furnished by the **Subcontractor** shall strictly comply with the requirements of this **Contract.**

17.7 Documents given to a prospective **Subcontractor** for the purpose of soliciting the **Subcontractor's** bid shall include either a copy of the bid cover or a separate information sheet setting forth the **Project** name, the **Contract** number (if available), the **Agency** (as noted in Article 2.1.6), and the **Project's** location.

17.8 The **Commissioner's** approval of a **Subcontractor** shall not relieve the **Contractor** of any of its responsibilities, duties, and liabilities hereunder. The **Contractor** shall be solely responsible to the **City** for the acts or defaults of its **Subcontractor** and of such **Subcontractor's** officers, agents, and employees, each of whom shall, for this purpose, be deemed to be the agent or employee of the **Contractor** to the extent of its subcontract.

17.9 If the **Subcontractor** fails to maintain the necessary facilities, skill, integrity, past experience, and financial resources (other than due to the **Contractor's** failure to make payments where required) to perform the **Work** in accordance with the terms and conditions of this **Contract**, the **Contractor** shall promptly notify the **Commissioner** and replace such **Subcontractor** with a newly approved **Subcontractor** in accordance with this Article 17.

17.10 The **Contractor** shall be responsible for ensuring that all **Subcontractors** performing **Work** at the **Site** maintain all insurance required by **Law**.

17.11 The **Contractor** shall promptly, upon request, file with the **Engineer** a conformed copy ofthe subcontract and its cost. The subcontract shall provide the following:

17.11.1 Payment to **Subcontractors**: The agreement between the **Contractor** and its **Subcontractor** shall contain the same terms and conditions as to method of payment for **Work**, labor, and materials, and as to retained percentages, as are contained in this **Contract**.

17.11.2 Prevailing Rate of Wages: The agreement between the **Contractor** and its **Subcontractor** shall include the prevailing wage rates and supplemental benefits to be paid in accordance with Labor Law Section 220.

17.11.3 Section 6-123 of the Administrative Code: Pursuant to the requirements of Section 6-123 of the Administrative Code, every agreement between the **Contractor** and a **Subcontractor** in excess of fifty thousand ($50,000) dollars shall include a provision that the **Subcontractor** shall not engage in any unlawful discriminatory practice as defined in Title VIII of the Administrative Code (Section 8-101 *et seq*.).

17.11.4 All requirements required pursuant to federal and/or state grant agreement(s), if applicable to the **Work**.

17.12 The **Commissioner** may deduct from the amounts certified under this **Contract** to be due to the **Contractor**, the sum or sums due and owing from the **Contractor** to the **Subcontractors** according to the terms of the said subcontracts, and in case of dispute between the **Contractor** and its **Subcontractor**, or **Subcontractors**, as to the amount due and owing, the **Commissioner** may deduct and withhold from the amounts certified under this **Contract** to be due to the **Contractor** such sum or sums as may be claimed by such **Subcontractor**, or **Subcontractors**, in a sworn affidavit, to be due and owing until such time as such claim or claims shall have been finally resolved.

17.13 On contracts where performance bonds and payment bonds are executed, the **Contractor** shall include on each requisition for payment the following data: **Subcontractor's** name, value of the subcontract, total amount previously paid to **Subcontractor** for **Work** previously requisitioned, and the amount, including retainage, to be paid to the **Subcontractor** for **Work** included in the requisition.

17.14 On **Contracts** where performance bonds and payment bonds are not executed, the **Contractor** shall include with each requisition for payment submitted hereunder, a signed statement from each and every **Subcontractor** and/or **Materialman** for whom payment is requested in such requisition. Such signed statement shall be on the letterhead of the **Subcontractor** and/or **Materialman** for whom payment is requested and shall (i) verify that such **Subcontractor** and/or **Materialman** has been paid in full for all **Work** performed and/or material supplied to date, exclusive of any amount retained and any amount included on the current requisition, and (ii) state the total amount of retainage to date, exclusive of any amount retained on the current requisition.

ARTICLE 18. ASSIGNMENTS

18.1 The **Contractor** shall not assign, transfer, convey or otherwise dispose of this **Contract**, or the right to execute it, or the right, title or interest in or to it or any part thereof, or assign, by power of attorney or otherwise any of the monies due or to become due under this **Contract**, unless the previous written consent of the **Commissioner** shall first be obtained thereto, and the giving of any such consent to a particular assignment shall not dispense with the necessity of such consent to any further or other assignments.

18.2 Such assignment, transfer, conveyance or other disposition of this **Contract** shall not be valid until filed in the office of the **Commissioner** and the **Comptroller**, with the written consent of the **Commissioner** endorsed thereon or attached thereto.

18.3 Failure to obtain the previous written consent of the **Commissioner** to such an assignment,

transfer, conveyance or other disposition, may result in the revocation and annulment of this **Contract**. The **City** shall thereupon be relieved and discharged from any further liability to the **Contractor**, its assignees, transferees or sublessees, who shall forfeit and lose all monies therefor earned under the **Contract**, except so much as may be required to pay the **Contractor's** employees.

18.4 The provisions of this clause shall not hinder, prevent, or affect an assignment by the **Contractor** for the benefit of its creditors made pursuant to the **Laws** of the State of New York.

18.5 This **Contract** may be assigned by the **City** to any corporation, agency or instrumentality having authority to accept such assignment.

CHAPTER V: CONTRACTOR'S SECURITY AND GUARANTEE

ARTICLE 19. SECURITY DEPOSIT

19.1 If performance and payment bonds are required, the **City** shall retain the bid security to ensure that the successful bidder executes the **Contract** and furnishes the required payment and performance security within ten (10) **Days** after notice of the award of the **Contract**. If the successful bidder fails to execute the **Contract** and furnish the required payment and performance security, the **City** shall retain such bid security as set forth in the Information for Bidders. If the successful bidder executes the **Contract** and furnishes the required payment and performance security, the **City** shall return the bid security within a reasonable time after the furnishing of such bonds and execution of the **Contract** by the **City**.

19.2 If performance and payment bonds are not required, the bid security shall be retained by the **City** as security for the **Contractor**'s faithful performance of the **Contract**. If partial payments are provided, the bid security will be returned to the **Contractor** after the sum retained under Article 21 equals the amount of the bid security, subject to other provisions of this **Contract**. If partial payments are not provided, the bid security will be released when final payment is certified by the **City** for payment.

19.3 If the **Contractor** is declared in default under Article 48 prior to the return of the deposit, or if any claim is made such as referred to in Article 23, the amount of such deposit, or so much thereof as the **Comptroller** may deem necessary, may be retained and then applied by the **Comptroller**:

19.3.1 To compensate the **City** for any expense, loss or damage suffered or incurred by reason of or resulting from such default, including the cost of re-letting and liquidated damages; or

19.3.2 To indemnify the **City** against any and all claims.

ARTICLE 20. PAYMENT GUARANTEE

20.1 On **Contracts** where one hundred (100%) percent performance bonds and payment bonds are executed, this Article 20 does not apply.

20.2 In the event the terms of this **Contract** do not require the **Contractor** to provide a payment bond or where the **Contract** does not require a payment bond for one hundred (100%) percent of the **Contract** price, the **City** shall, in accordance with the terms of this Article 20, guarantee payment of all lawful claims for:

20.2.1 Wages and compensation for labor performed and/or services rendered; and

20.2.2 Materials, equipment, and supplies provided, whether incorporated into the **Work** or not, when demands have been filed with the **City** as provided hereinafter by any person, firm, or corporation which furnished labor, material, equipment, supplies, or any combination thereof, in connection with the **Work** performed hereunder (hereinafter referred to as the "beneficiary") at the direction of the **City** or the **Contractor**.

20.3 The provisions of Article 20.2 are subject to the following limitations and conditions:

20.3.1 If the **Contractor** provides a payment bond for a value that is less than one hundred (100%) percent of the value of the **Contract Work**, the payment bond provided by the **Contractor** shall be primary (and non-contributing) to the payment guarantee provided under this Article 20.

20.3.2 The guarantee is made for the benefit of all beneficiaries as defined in Article 20.2 provided that those beneficiaries strictly adhere to the terms and conditions of Article 20.3.4 and 20.3.5.

20.3.3 Nothing in this Article 20 shall prevent a beneficiary providing labor, services or material for the **Work** from suing the **Contractor** for any amounts due and owing the beneficiary by the **Contractor**.

20.3.4 Every person who has furnished labor or material, to the **Contractor** or to a **Subcontractor** of the **Contractor**, in the prosecution of the **Work** and who has not been paid in full therefor before the expiration of a period of ninety (90) **Days** after the date on which the last of the labor was performed or material was furnished by him/her for which the claim is made, shall have the right to sue on this payment guarantee in his/her own name for the amount, or the balance thereof, unpaid at the time of commencement of the action; provided, however, that a person having a direct contractual relationship with a **Subcontractor** of the **Contractor** but no contractual relationship express or implied with the **Contractor** shall not have a right of action upon the guarantee unless he/she shall have given written notice to the **Contractor** within one hundred twenty (120) **Days** from the date on which the last of the labor was performed or the last of the material was furnished, for which his/her claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the material was furnished or for whom the labor was performed. The notice shall be served by delivering the same personally to the **Contractor** or by mailing the same by registered mail, postage prepaid, in an envelope addressed to the **Contractor** at any place where it maintains an office or conducts its business; provided, however, that where such notice is actually received by the **Contractor** by other means, such notice shall be deemed sufficient.

20.3.5 Except as provided in Labor Law Section 220-g, no action on this payment guarantee shall be commenced after the expiration of the one-year limitations period set forth in Section 137(4)(b) of the State Finance Law.

20.3.6 The **Contractor** shall promptly forward to the **City** any notice or demand received pursuant to Article 20.3.4. The **Contractor** shall inform the **City** of any defenses to the notice or demand and shall forward to the **City** any documents the **City** requests concerning the notice or demand.

20.3.7 All demands made against the **City** by a beneficiary of this payment guarantee shall be presented to the **Engineer** along with all written documentation concerning the demand which the **Engineer** deems reasonably appropriate or necessary, which may include, but shall not be

limited to: the subcontract; any invoices presented to the **Contractor** for payment; the notarized statement of the beneficiary that the demand is due and payable, that a request for payment has been made of the **Contractor** and that the demand has not been paid by the **Contractor** within the time allowed for such payment by the subcontract; and copies of any correspondence between the beneficiary and the **Contractor** concerning such demand. The **City** shall notify the **Contractor** that a demand has been made. The **Contractor** shall inform the **City** of any defenses to the demand and shall forward to the **City** any documents the **City** requests concerning the demand.

20.3.8 The **City** shall make payment only if, after considering all defenses presented by the **Contractor**, it determines that the payment is due and owing to the beneficiary making the demand.

20.3.9 No beneficiary shall be entitled to interest from the **City**, or to any other costs, including, but not limited to, attorneys' fees, except to the extent required by State Finance Law Section 137.

20.3.10

20.4 Upon the receipt by the **City** of a demand pursuant to this Article 20, the **City** may withhold from any payment otherwise due and owing to the **Contractor** under this **Contract** an amount sufficient to satisfy the demand.

20.4.1 In the event the **City** determines that the demand is valid, the **City** shall notify the **Contractor** of such determination and the amount thereof and direct the **Contractor** to immediately pay such amount to the beneficiary. In the event the **Contractor**, within seven (7) **Days** of receipt of such notification from the **City**, fails to pay the beneficiary, such failure shall constitute an automatic and irrevocable assignment of payment by the **Contractor** to the beneficiary for the amount of the demand determined by the **City** to be valid. The **Contractor**, without further notification or other process, hereby gives its unconditional consent to such assignment of payment to the beneficiary and authorizes the **City**, on its behalf, to take all necessary actions to implement such assignment of payment, including without limitation the execution of any instrument or documentation necessary to effectuate such assignment.

20.4.2 In the event that the amount otherwise due and owing to the **Contractor** by the **City** is insufficient to satisfy such demand, the **City** may, at its option, require payment from the **Contractor** of an amount sufficient to cover such demand and exercise any other right to require or recover payment which the **City** may have under **Law** or **Contract**.

20.4.3 In the event the **City** determines that the demand is invalid, any amount withheld pending the **City**'s review of such demand shall be paid to the **Contractor**; provided, however, no lien has been filed. In the event a claim or an action has been filed, the terms and conditions set forth in Article 23 shall apply. In the event a lien has been filed, the parties will be governed by the provisions of the Lien Law of the State of New York.

20.5 The provisions of this Article 20 shall not prevent the **City** and the **Contractor** from resolving disputes in accordance with the **PPB** Rules, where applicable.

20.6 In the event the **City** determines that the beneficiary is entitled to payment pursuant to this Article 20, such determination and any defenses and counterclaims raised by the **Contractor** shall be taken into account in evaluating the **Contractor's** performance.

20.7 Nothing in this Article 20 shall relieve the **Contractor** of the obligation to pay the claims of all

persons with valid and lawful claims against the **Contractor** relating to the **Work**.

20.8 The **Contractor** shall not require any performance, payment or other bonds of any **Subcontractor** if this **Contract** does not require such bonds of the **Contractor**.

20.9 The payment guarantee made pursuant to this Article 20 shall be construed in a manner consistent with Section 137 of the State Finance Law and shall afford to persons furnishing labor or materials to the **Contractor** or its **Subcontractors** in the prosecution of the **Work** under this **Contract** all of the rights and remedies afforded to such persons by such section, including but not limited to, the right to commence an action against the **City** on the payment guarantee provided by this Article 20 within the one-year limitations period set forth in Section 137(4)(b).

ARTICLE 21. RETAINED PERCENTAGE

21.1 If this **Contract** requires one hundred (100%) percent performance and payment security, then as further security for the faithful performance of this **Contract**, the **Commissioner** shall deduct, and retain until the substantial completion of the **Work**, five (5%) percent of the value of **Work** certified for payment in each partial payment voucher.

21.2 If this **Contract** does not require one hundred (100%) percent performance and payment security and if the price for which this **Contract** was awarded does not exceed one million ($1,000,000) dollars, then as further security for the faithful performance of this **Contract**, the **Commissioner** shall deduct, and retain until the substantial completion of the **Work**, five (5%) percent of the value of **Work** certified for payment in each partial payment voucher.

21.3 If this **Contract** does not require one hundred (100%) percent performance and payment security and if the price for which this **Contract** was awarded exceeds one million ($1,000,000) dollars, then as further security for the faithful performance of this **Contract,** the **Commissioner** shall deduct, and retain until the substantial completion of the **Work**, up to ten (10%) percent of the value of **Work** certified for payment in each partial payment voucher. The percentage to be retained is set forth in Schedule A of the General Conditions.

ARTICLE 22. INSURANCE

22.1 Types of Insurance: The **Contractor** shall procure and maintain the following types of insurance if, and as indicated, in Schedule A of the General Conditions (with the minimum limits and special conditions specified in Schedule A). Such insurance shall be maintained from the date the **Contractor** is required to provide Proof of Insurance pursuant to Article 22.3.1 through the date of completion of all required **Work** (including punch list work as certified in writing by the **Resident Engineer**), except for insurance required pursuant to Article 22.1.4, which may terminate upon **Substantial Completion** of the **Contract**. All insurance shall meet the requirements set forth in this Article 22. Wherever this Article requires that insurance coverage be "at least as broad" as a specified form (including all ISO forms), there is no obligation that the form itself be used, provided that the **Contractor** can demonstrate that the alternative form or endorsement contained in its policy provides coverage at least as broad as the specified form.

22.1.1 Commercial General Liability Insurance: The **Contractor** shall provide Commercial General Liability Insurance covering claims for property damage and/or bodily injury, including death, which may arise from any of the operations under this **Contract**. Coverage under this insurance shall be at least as broad as that provided by the latest edition of Insurance

Services Office ("ISO") Form CG 0001. Such insurance shall be "occurrence" based rather than "claims-made" and include, without limitation, the following types of coverage: premises operations; products and completed operations; contractual liability (including the tort liability of another assumed in a contract); broad form property damage; independent contractors; explosion, collapse and underground (XCU); construction means and methods; and incidental malpractice. Such insurance shall contain a "per project" aggregate limit, as specified in Schedule A, that applies separately to operations under this **Contract**.

22.1.1(a) Such Commercial General Liability Insurance shall name the **City** as an Additional Insured. Coverage for the City shall specifically include the **City's** officials and employees, be at least as broad as the latest edition of ISO Form CG 20 10 and provide completed operations coverage at least as broad as the latest edition of ISO Form CG 20 37.

22.1.1(b) Such Commercial General Liability Insurance shall name all other entities designated as additional insureds in Schedule A but only for claims arising from the **Contractor's** operations under this **Contract**, with coverage at least as broad as the latest edition of ISO Form CG 20 26.

22.1.1(c) If the **Work** requires a permit from the Department of Buildings pursuant to 1 RCNY Section 101-08, the **Contractor** shall provide Commercial General Liability Insurance with limits of at least those required by 1 RCNY section 101-08 or greater limits required by the Agency in accordance with Schedule A. If the **Work** does not require such a permit, the minimum limits shall be those provided for in Schedule A.

22.1.1(d) If any of the **Work** includes repair of a waterborne vessel owned by or to be delivered to the **City**, such Commercial General Liability shall include, or be endorsed to include, Ship Repairer's Legal Liability Coverage to protect against, without limitation, liability arising from navigation of such vessels prior to delivery to and acceptance by the **City**.

22.1.2 Workers' Compensation Insurance, Employers' Liability Insurance, and Disability Benefits Insurance: The **Contractor** shall provide, and shall cause its **Subcontractors** to provide, Workers Compensation Insurance, Employers' Liability Insurance, and Disability Benefits Insurance in accordance with the **Laws** of the State of New York on behalf of all employees providing services under this **Contract** (except for those employees, if any, for which the **Laws** require insurance only pursuant to Article 22.1.3).

22.1.3 United States Longshoremen's and Harbor Workers Act and/or Jones Act Insurance: If specified in Schedule A of the General Conditions or if required by **Law**, the **Contractor** shall provide insurance in accordance with the United States Longshoremen's and Harbor Workers Act and/or the Jones Act, on behalf of all qualifying employees providing services under this **Contract**.

22.1.4 Builders Risk Insurance: If specified in Schedule A of the General Conditions, the **Contractor** shall provide Builders Risk Insurance on a completed value form for the total value of the **Work** through **Substantial Completion** of the **Work** in its entirety. Such insurance shall be provided on an All Risk basis and include coverage, without limitation, for windstorm (including named windstorm), storm surge, flood and earth movement. Unless waived by the **Commissioner**, it shall include coverage for ordinance and law, demolition and increased costs of construction, debris removal, pollutant clean up and removal, and expediting costs. Such insurance shall cover, without limitation, (a) all buildings and/or structures involved in the

Work, as well as temporary structures at the **Site**, and (b) any property that is intended to become a permanent part of such building or structure, whether such property is on the **Site**, in transit or in temporary storage. Policies shall name the **Contractor** as Named Insured and list the **City** as both an Additional Insuredand a Loss Payee as its interest may appear.

22.1.4(a) Policies of such insurance shall specify that, in the event a loss occurs at an occupied facility, occupancy of such facility is permitted without the consent of the issuing insurance company.

22.1.4(b) Such insurance may be provided through an Installation Floater, at the **Contractor's** option, if it otherwise conforms with the requirements of this Article 22.1.4.

22.1.5 Commercial Automobile Liability Insurance: The **Contractor** shall provide Commercial Automobile Liability Insurance for liability arising out of ownership, maintenance or use of any owned (if any), non-owned and hired vehicles to be used in connection with this **Contract**. Coverage shall be at least as broad as the latest edition of ISO Form CA0001. If vehicles are used for transporting hazardous materials, the Automobile Liability Insurance shall be endorsed to provide pollution liability broadened coverage for covered vehicles (endorsement CA 99 48) as well as proof of MCS 90.

22.1.6 Contractors Pollution Liability Insurance: If specified in Schedule A of the General Conditions, the **Contractor** shall maintain, or cause the **Subcontractor** doing such **Work**to maintain, Contractors Pollution Liability Insurance covering bodily injury and property damage. Such insurance shall provide coverage for actual, alleged or threatened emission, discharge, dispersal, seepage, release or escape of pollutants (including asbestos), including any loss, cost or expense incurred as a result of any cleanup of pollutants (including asbestos) or in the investigation, settlement or defense of any claim, action, or proceedings arising from the operations under this **Contract**. Such insurance shall be in the **Contractor's** name and list the **City** as an Additional Insured and any other entity specified in Schedule A. Coverage shall include, without limitation, (a) loss of use of damaged property or of property that has not been physically injured, (b) transportation, and (c) non- owned disposal sites.

22.1.6(a) Coverage for the **City** as Additional Insured shall specifically include the **City's** officials and employees and be at least as broad as provided to the **Contractor** for this **Project**.

22.1.6(b) If such insurance is written on a claims-made policy, such policy shall have a retroactive date on or before the effective date of this **Contract**, and continuous coverage shall be maintained, or an extended discovery period exercised, for a period of not less than three (3) years from the time the **Work** under this **Contract** is completed.

22.1.7 Marine Insurance:

22.1.7(a) Marine Protection and Indemnity Insurance: If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the**Subcontractor** doing such Work to maintain, Marine Protection and Indemnity Insurance with coverage at least as broad as Form SP-23. The insurance shall provide coverage for the **Contractor** or **Subcontractor** (whichever is doing this **Work**) and for the **City** (together with its officials and employees) and any other entity specified in Schedule A as an Additional Insured for bodily injury and property damage arising from marine operations under this

Contract. Coverage shall include, without limitation, injury or death of crew members (if not fully provided through other insurance), removal of wreck, damage to piers, wharves and other fixed or floating objects and loss of or damage to any other vessel or craft, or to property on such other vessel or craft.

22.1.7(b) Hull and Machinery Insurance: If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the **Subcontractor** doing such **Work** to maintain, Hull and Machinery Insurance with coverage for the **Contractor** or **Subcontractor** (whichever is doing this Work) and for the **City** (together with its officials and employees) as Additional Insured at least as broad as the latest edition of American Institute Tug Form for all tugs used under this **Contract** and Collision Liability at least as broad as the latest edition of American Institute Hull Clauses.

22.1.7(c) Marine Pollution Liability Insurance: If specified in Schedule A of the General Conditions or if the **Contractor** engages in marine operations in the execution of any part of the **Work**, the **Contractor** shall maintain, or cause the **Subcontractor** doing such Work to maintain, Marine Pollution Liability Insurance covering itself (or the Subcontractor doing such Work) as Named Insured and the **City** (together with its officials and employees) and any other entity specified in Schedule A as an Additional Insured. Coverage shall be at least as broad as that provided by the latest edition of Water Quality Insurance Syndicate Form and include, without limitation, liability arising from the discharge or substantial threat of a discharge of oil, or from the release or threatened release of a hazardous substance including injury to, or economic losses resulting from, the destruction of or damage to real property, personal property or natural resources.

22.1.8 The **Contractor** shall provide such other types of insurance, at such minimum limits and with such conditions, as are specified in Schedule A of the General Conditions.

22.2 General Requirements for Insurance Coverage and Policies:

22.2.1 All required insurance policies shall be maintained with companies that may lawfully issue the required policy and have an A.M. Best rating of at least A-/VII or a Standard and Poor's rating of at least A, unless prior written approval is obtained from the **City** Corporation Counsel.

22.2.2 The **Contractor** shall be solely responsible for the payment of all premiums for all required policies and all deductibles and self-insured retentions to which such policies are subject, whether or not the **City** is an insured under the policy.

22.2.3 In his/her sole discretion, the **Commissioner** may, subject to the approval of the **Comptroller** and the **City** Corporation Counsel, accept Letters of Credit and/or custodial accounts in lieu of required insurance.

22.2.4 The **City's** limits of coverage for all types of insurance required pursuant to Schedule A of the General Conditions shall be the greater of (i) the minimum limits set forth in Schedule A or (ii) the limits provided to the **Contractor** as Named Insured under all primary, excess, and umbrella policies of that type of coverage.

22.2.5 The **Contractor** may satisfy its insurance obligations under this Article 22 through primary policies or a combination of primary and excess/umbrella policies, so long as all policies provide the scope of coverage required herein.

22.2.6 Policies of insurance provided pursuant to this Article 22 shall be primary and non-contributing to any insurance or self-insurance maintained by the **City**.

22.3 Proof of Insurance:

22.3.1 For all types of insurance required by Article 22.1 and Schedule A, except for insurance required by Articles 22.1.4 and 22.1.7, the **Contractor** shall file proof of insurance in accordance with this Article 22.3 within ten (10) **Days** of award. For insurance provided pursuant to Articles 22.1.4 and 22.1.7, proof shall be filed by a date specified by the **Commissioner** or ten (10) **Days** prior to the commencement of the portion of the **Work** covered by such policy, whichever is earlier.

22.3.2 For Workers' Compensation Insurance provided pursuant to Article 22.1.2, the **Contractor** shall submit one of the following forms: C-105.2 Certificate of Workers' Compensation Insurance; U-26.3 - State Insurance Fund Certificate of Workers' Compensation Insurance; Request for WC/DB Exemption (Form CE-200); equivalent or successor forms used by the New York State Workers' Compensation Board; or other proof of insurance in a form acceptable to the **Commissioner**. For Disability Benefits Insurance provided pursuant to Article 22.1.2, the Contractor shall submit DB-120.1 - Certificate Of Insurance Coverage Under The NYS Disability Benefits Law, Request for WC/DB Exemption (Form CE-200); equivalent or successor forms used by the New York State Workers' Compensation Board; or other proof of insurance in a form acceptable to the **Commissioner**. ACORD forms are not acceptable.

22.3.3 For policies provided pursuant to all of Article 22.1 other than Article 22.1.2, the **Contractor** shall submit one or more Certificates of Insurance on forms acceptable to the **Commissioner**. All such Certificates of Insurance shall certify (a) the issuance and effectiveness of such policies of insurance, each with the specified minimum limits (b) for insurance secured pursuant to Article 22.1.1 that the **City** and any other entity specified in Schedule A is an Additional Insured thereunder; (c) in the event insurance is required pursuant to Article 22.1.6 and/or Article 22.1.7, that the City is an Additional Insured thereunder; (d) the company code issued to the insurance company by the National Association of Insurance Commissioners (the NAIC number); and (e) the number assigned to the **Contract** by the **City**. All such Certificates of Insurance shall be accompanied by either a duly executed "Certification by Insurance Broker or Agent" in the form contained in Part III of Schedule A or copies of all policies referenced in such Certificate of Insurance as certified by an authorized representative of the issuing insurance carrier. If any policy is not available at the time of submission, certified binders may be submitted until such time as the policy is available, at which time a certified copy of the policy shall be submitted.

22.3.4 Documentation confirming renewals of insurance shall be submitted to the **Commissioner** prior to the expiration date of coverage of policies required under this **Contract**. Such proofs of insurance shall comply with the requirements of Articles 22.3.2 and 22.3.3.

22.3.5 The **Contractor** shall be obligated to provide the **City** with a copy of any policy of insurance provided pursuant to this Article 22 upon the demand for such policy by the **Commissioner** or the **City** Corporation Counsel.

22.4 Operations of the **Contractor**:

22.4.1 The **Contractor** shall not commence the **Work** unless and until all required certificates have been submitted to and accepted by the **Commissioner**. Acceptance by the

Commissioner of a certificate does not excuse the **Contractor** from securing insurance consistent with all provisions of this Article 22 or of any liability arising from its failure todo so.

22.4.2 The **Contractor** shall be responsible for providing continuous insurance coverage in the manner, form, and limits required by this **Contract** and shall be authorized to perform **Work** only during the effective period of all required coverage.

22.4.3 In the event that any of the required insurance policies lapse, are revoked, suspended or otherwise terminated, for whatever cause, the **Contractor** shall immediately stop all **Work**, and shall not recommence **Work** until authorized in writing to do so by the **Commissioner**. Upon quitting the **Site**, except as otherwise directed by the **Commissioner**, the **Contractor** shall leave all plant, materials, equipment, tools, and supplies on the **Site**. **Contract** time shall continue to run during such periods and no extensions of time will be granted. The **Commissioner** may also declare the **Contractor** in default for failure to maintain required insurance.

22.4.4 In the event the **Contractor** receives notice, from an insurance company or other person, that any insurance policy required under this Article 22 shall be cancelled or terminated (or has been cancelled or terminated) for any reason, the **Contractor** shall immediately forward a copy of such notice to both the **Commissioner** and the New York City Comptroller, attn: Office of Contract Administration, Municipal Building, One Centre Street, room 1005, New York, New York 10007. Notwithstanding the foregoing, the**Contractor** shall ensure that there is no interruption in any of the insurance coverage required under this Article 22.

22.4.5 Where notice of loss, damage, occurrence, accident, claim or suit is required under an insurance policy maintained in accordance with this Article 22, the **Contractor** shall notify in writing all insurance carriers that issued potentially responsive policies of any such event relating to any operations under this **Contract** (including notice to Commercial General Liability insurance carriers for events relating to the **Contractor**'s own employees) no later than 20 days after such event. For any policy where the **City** is an Additional Insured, such notice shall expressly specify that "this notice is being given on behalf of the City of New York as Insured as well as the Named Insured." Such notice shall also contain the following information: the number of the insurance policy, the name of the named insured, the date and location of the damage, occurrence, or accident, and the identity of the persons or things injured, damaged or lost. The **Contractor** shall simultaneously send a copy of such notice to the City of New York c/o Insurance Claims Specialist, Affirmative Litigation Division, New York City Law Department, 100 Church Street, New York, New York 10007.

22.4.6 In the event of any loss, accident, claim, action, or other event that does or can give rise to a claim under any insurance policy required under this Article 22, the **Contractor** shall at all times fully cooperate with the **City** with regard to such potential or actual claim.

22.5 **Subcontractor** Insurance: In the event the **Contractor** requires any **Subcontractor** to procure insurance with regard to any operations under this **Contract** and requires such **Subcontractor** to name the **Contractor** as an **Additional Insured** thereunder, the **Contractor** shall ensure that the **Subcontractor** name the **City**, including its officials and employees, as an Additional Insured with coverage at least as broad as the most recent edition of ISO Form CG 20 26.

22.6 Wherever reference is made in Article 7 or this Article 22 to documents to be sent to the **Commissioner** (e.g., notices, filings, or submissions), such documents shall be sent to the address set forth in Schedule A of the General Conditions. In the event no address is set forth in Schedule A, such documents

are to be sent to the **Commissioner's** address as provided elsewhere in this **Contract**.

22.7 Apart from damages or losses covered by insurance provided pursuant to Articles 22.1.2, 22.1.3, or 22.1.5, the **Contractor** waives all rights against the **City**, including its officials and employees, for any damages or losses that are covered under any insurance required under this Article 22 (whether or not such insurance is actually procured or claims are paid thereunder) or any other insurance applicableto the operations of the **Contractor** and/or its employees, agents, or **Subcontractors**.

22.8 In the event the **Contractor** utilizes a self-insurance program to satisfy any of the requirements of this Article 22, the **Contractor** shall ensure that any such self-insurance program provides the **City** with all rights that would be provided by traditional insurance under this Article 22, including but not limited to the defense and indemnification obligations that insurers are required to undertake in liability policies.

22.9 Materiality/Non-Waiver: The **Contractor's** failure to secure policies in complete conformity with this Article 22, or to give an insurance company timely notice of any sort required in this **Contract** or to do anything else required by this Article 22 shall constitute a material breach of this **Contract**. Such breach shall not be waived or otherwise excused by any action or inaction by the **City** at any time.

22.10 Pursuant to General Municipal Law Section 108, this **Contract** shall be void and of no effect unless **Contractor** maintains Workers' Compensation Insurance for the term of this **Contract** tothe extent required and in compliance with the New York State Workers' Compensation Law.

22.11 Other Remedies: Insurance coverage provided pursuant to this Article 22 or otherwise shall not relieve the **Contractor** of any liability under this **Contract**, nor shall it preclude the **City** from exercising any rights or taking such other actions available to it under any other provisions of this **Contract** or **Law**.

ARTICLE 23. MONEY RETAINED AGAINST CLAIMS

23.1 If any claim shall be made by any person or entity (including **Other Contractors** with the **City** on this **Project**) against the **City** or against the **Contractor** and the **City** for any of the following:

(a) An alleged loss, damage, injury, theft or vandalism of any of the kinds referred to in Articles 7 and 12, plus the reasonable costs of defending the **City**, which in the opinion of the **Comptroller** may not be paid by an insurance company (for any reason whatsoever);or

(b) An infringement of copyrights, patents or use of patented articles, tools, etc., asreferred to in Article 57; or

(c) Damage claimed to have been caused directly or indirectly by the failure of the **Contractor** to perform the **Work** in strict accordance with this **Contract,**

the amount of such claim, or so much thereof as the **Comptroller** may deem necessary, may be withheld by the **Comptroller**, as security against such claim, from any money due hereunder. The **Comptroller**, in his/her discretion, may permit the **Contractor** to substitute other satisfactory security in lieu of the monies so withheld.

23.2 If an action on such claim is timely commenced and the liability of the **City**, or the **Contractor**,

or both, shall have been established therein by a final judgment of a court of competent jurisdiction, or if such claim shall have been admitted by the **Contractor** to be valid, the **Comptroller** shall pay such judgment or admitted claim out of the monies retained by the **Comptroller** under the provisions of this Article 23, and return the balance, if any, without interest, to the **Contractor**.

ARTICLE 24. MAINTENANCE AND GUARANTY

24.1 The **Contractor** shall promptly repair, replace, restore or rebuild, as the **Commissioner** may determine, any finished **Work** in which defects of materials or workmanship may appear or to which damage may occur because of such defects, during the one (1) year period subsequent to the date of **Substantial Completion** (or use and occupancy in accordance with Article 16), except where other periods of maintenance and guaranty are provided for in Schedule A.

24.2 As security for the faithful performance of its obligations hereunder, the **Contractor**, upon filing its requisition for payment on **Substantial Completion**, shall deposit with the **Commissioner** a sum equal to one (1%) percent of the price (or the amount fixed in Schedule A of the General Conditions) in cash or certified check upon a state or national bank and trust company or a check of such bank and trust company signed by a duly authorized officer thereof and drawn to the order of the **Comptroller**, or obligations of the **City**, which the **Comptroller** may approve as of equal value with the sum so required.

24.3 In lieu of the above, the **Contractor** may make such security payment to the **City** byauthorizing the **Commissioner** in writing to deduct the amount from the **Substantial Completion** payment which shall be deemed the deposit required above.

24.4 If the **Contractor** has faithfully performed all of its obligations hereunder the **Commissioner** shall so certify to the **Comptroller** within five (5) **Days** after the expiration of one (1) year from the date of **Substantial Completion** and acceptance of the **Work** or within thirty (30) **Days** after the expirationof the guarantee period fixed in the **Specifications**. The security payment shall be repaid to the **Contractor** without interest within thirty (30) **Days** after certification by the **Commissioner** to the **Comptroller** that the **Contractor** has faithfully performed all of its obligations hereunder.

24.5 Notice by the **Commissioner** to the **Contractor** to repair, replace, rebuild or restore such defective or damaged **Work** shall be timely, pursuant to this article, if given not later than ten (10) **Days** subsequent to the expiration of the one (1) year period or other periods provided for herein.

24.6 If the **Contractor** shall fail to repair, replace, rebuild or restore such defective or damaged **Work** promptly after receiving such notice, the **Commissioner** shall have the right to have the **Work** done by others in the same manner as provided for in the completion of a defaulted **Contract**, under Article 51.

24.7 If the security payment so deposited is insufficient to cover the cost of such **Work**, the **Contractor** shall be liable to pay such deficiency on demand by the **Commissioner**.

24.8 The **Engineer's** certificate setting forth the fair and reasonable cost of repairing, replacing, rebuilding or restoring any damaged or defective **Work** when performed by one other than the **Contractor**, shall be binding and conclusive upon the **Contractor** as to the amount thereof.

24.9 The **Contractor** shall obtain all manufacturers' warranties and guaranties of all equipment and materials required by this **Contract** in the name of the **City** and shall deliver same to the **Commissioner**. All of the **City's** rights and title and interest in and to said manufacturers' warranties and guaranties may be assigned by the **City** to any subsequent purchasers of such equipment and materials or lessees of the

premises into which the equipment and materials have been installed.

CHAPTER VI: CHANGES, EXTRA WORK, AND DOCUMENTATION OF CLAIM

ARTICLE 25. CHANGES

25.1 Changes may be made to this **Contract** only as duly authorized in writing by the **Commissioner** in accordance with the **Law** and this **Contract**. All such changes, modifications, and amendments will become a part of the **Contract**. **Work** so ordered shall be performed by the **Contractor**.

25.2 **Contract** changes will be made only for **Work** necessary to complete the **Work** included inthe original scope of the **Contract** and/or for non-material changes to the scope of the **Contract**.Changes are not permitted for any material alteration in the scope of **Work** in the **Contract**.

25.3 The **Contractor** shall be entitled to a price adjustment for **Extra Work** performed pursuant toa written change order. Adjustments to price shall be computed in one or more of the following ways:

25.3.1 By applicable unit prices specified in the **Contract**; and/or

25.3.2 By agreement of a fixed price; and/or

25.3.3 By time and material records; and/or

25.3.4 In any other manner approved by the **CCPO**.

25.4 All payments for change orders are subject to pre-audit by the **Engineering Audit Officer** and may be post-audited by the **Comptroller** and/or the **Agency**.

ARTICLE 26. METHODS OF PAYMENT FOR OVERRUNS AND EXTRA WORK

26.1 Overrun of Unit Price Item: An overrun is any quantity of a unit price item which the **Contractor** is directed to provide which is in excess of one hundred twenty-five (125%) percent of the estimated quantity for that item set forth in the bid schedule.

26.1.1 For any unit price item, the **Contractor** will be paid at the unit price bid for any quantity up to one hundred twenty-five (125%) percent of the estimated quantity for that item set forth in the bid schedule. If during the progress of the **Work**, the actual quantity of any unit price item required to complete the **Work** approaches the estimated quantity forthat item, and for any reason it appears that the actual quantity of any unit price item necessary to complete the **Work** will exceed the estimated quantity for that item by twenty- five (25%) percent, the **Contractor** shall immediately notify the **Engineer** of such anticipated overrun. The **Contractor** shall not be compensated for any quantity of a unit price item provided which is in excess of one hundred twenty-five (125%) percent of the estimated quantity for that item set forth in the bid schedule without written authorization from the **Engineer**.

26.1.2 If the actual quantity of any unit price item necessary to complete the **Work** will exceed one hundred twenty five (125%) percent of the estimated quantity for that item set forth in the bid schedule, the **City** reserves the right and the **Contractor** agrees to negotiate a new unit price for such item. In no event shall such negotiated new unit price exceed the unit bid price. If the **City** and **Contractor** cannot agree on a new unit price, then the **City** shall order the **Contractor** and the **Contractor** agrees to provide additional quantities of the item on the

basis of time and material records for the actual and reasonable cost as determined under Article 26.2, but in no event at a unit price exceeding the unit price bid.

26.2 **Extra Work:** For **Extra Work** where payment is by agreement on a fixed price in accordance with Article 25.3.2, the price to be paid for such **Extra Work** shall be based on the fair and reasonable estimated cost of the items set forth below. For **Extra Work** where payment is based on time and material records in accordance with Article 25.3.3, the price to be paid for such **Extra Work** shall be the actual and reasonable cost of the items set forth below, calculated in accordance with the formula specified therein, if any.

26.2.1 Necessary materials (including transportation to the **Site**); plus

26.2.2 Necessary direct labor, including payroll taxes (subject to statutory wage caps) and supplemental benefits; plus

26.2.3 Sales and personal property taxes, if any, required to be paid on materials not incorporated into such **Extra Work**; plus

26.2.4 Reasonable rental value of **Contractor**-owned (or **Subcontractor**-owned, as applicable), necessary plant and equipment other than **Small Tools**, plus fuel/energy costs. Except for fuel costs for pick-up trucks which shall be reimbursed based on a consumption of five (5) gallons per shift, fuel costs shall be reimbursed based on actual costs or, in the absence of auditable documentation, the following fuel consumption formula per operating hour: (.035) x (HP rating) x (Fuel cost/gallon). Reasonable rental value is defined as the lower of either seventy-five percent of the monthly prorated rental rates established in "The AED Green Book, Rental Rates and Specifications for Construction Equipment" published by Equipment Watch (the "Green Book"), or seventy-five percent of the monthly prorated rental rates established in the "Rental Rate Blue Book for Construction Equipment" published by Equipment Watch (the "Blue Book") (the applicable Blue Book rate being for rental only without the addition of any operational costs listed in the Blue Book). The reasonable rental value is deemed to be inclusive of all operating costs except for fuel/energy consumption and equipment operator's wages/costs. For multiple shift utilization, reimbursement shall be calculated as follows: first shift shall be seventy-five (75%) percent of such rental rates; second shift shall be sixty (60%) percent of the first shift rate; and third shift shall be forty (40%) percent of the first shift rate. Equipment on standby shall be reimbursed at one-third (1/3) the prorated monthly rental rate. **Contractor**-owned (or **Subcontractor**-owned, as applicable) equipment includes equipment from rental companies affiliated with or controlled by the **Contractor** (or **Subcontractor**, as applicable)**,** as determined by the **Commissioner**. In establishing cost reimbursement for non-operating **Contractor**-owned (or **Subcontractor**-owned, as applicable) equipment (scaffolding, sheeting systems, road plates, etc.), the **City** may restrict reimbursement to a purchase-salvage/life cycle basis if less than the computed rental costs; plus

26.2.5 Necessary installation and dismantling of such plant and equipment, including transportation to and from the **Site**, if any, provided that, in the case of non-**Contractor**-owned (or non-**Subcontractor**-owned, as applicable) equipment rented from a third party, the cost of installation and dismantling are not allowable if such costs are included in the rental rate; plus

26.2.6 Necessary fees charged by governmental entities; plus

26.2.7 Necessary construction-related service fees charged by non-governmental entities, such as landfill tipping fees; plus

26.2.8 Reasonable rental costs of non-**Contractor**-owned (or non-**Subcontractor**-owned, as applicable) necessary plant and equipment other than **Small Tools**, plus fuel/energy costs. Except for fuel costs for pick-up trucks which shall be reimbursed based on a consumption of five (5) gallons per shift, fuel costs shall be reimbursed based on actual costs or, in the absence of auditable documentation, the following fuel consumption formula per hour of operation: (.035) x (HP rating) x (Fuel cost/gallon). In lieu of renting, the **City** reserves the right to direct the purchase of non-operating equipment (scaffolding, sheeting systems, road plates, etc.), with payment on a purchase-salvage/life cycle basis, if less than the projected rental costs; plus

26.2.9 Workers' Compensation Insurance, and any insurance coverage expressly required by the **City** for the performance of the **Extra Work** which is different than the types of insurance required by Article 22 and Schedule A of the General Conditions. The cost of Workers' Compensation Insurance is subject to applicable payroll limitation caps and shall be based upon the carrier's Manual Rate for such insurance derived from the applicable class Loss Cost ("LC") and carrier's Lost Cost Multiplier ("LCM") approved by the New York State Department of Financial Services, and with the exception of experience rating, rate modifiers as promulgated by the New York Compensation Insurance Rating Board ("NYCIRB"); plus

26.2.10 Additional costs incurred as a result of the **Extra Work** for performance and payment bonds; plus

26.2.11 Twelve percent (12%) percent of the total of items in Articles 26.2.1 through 26.2.5 as compensation for overhead, except that no percentage for overhead will be allowed on **Payroll Taxes** or on the premium portion of overtime pay or on sales and personal property taxes. Overhead shall include without limitation, all costs and expenses in connection with administration, management superintendence, small tools, and insurance required by Schedule A of the General Conditions other than Workers' Compensation Insurance; plus

26.2.12 Ten (10%) percent of the total of items in Articles 26.2.1 through 26.2.5, plus the items in Article 26.2.11, as compensation for profit, except that no percentage for profit will be allowed on **Payroll Taxes** or on the premium portion of overtime pay or on sales and personal property taxes; plus

26.2.13 Five (5%) percent of the total of items in Articles 26.2.6 through 26.2.10 as compensation for overhead and profit.

26.3 Where the **Extra Work** is performed in whole or in part by other than the **Contractor's** own forces pursuant to Article 26.2, the **Contractor** shall be paid, subject to pre-audit by the **Engineering Audit Officer**, the cost of such **Work** computed in accordance with Article 26.2 above, plus an additional allowance of five (5%) percent to cover the **Contractor's** overhead and profit.

26.4 Where a change is ordered, involving both **Extra Work** and omitted or reduced **Contract Work,** the **Contract** price shall be adjusted, subject to pre-audit by the **EAO**, in an amount based on the difference between the cost of such **Extra Work** and of the omitted or reduced **Work**.

26.5 Where the **Contractor** and the **Commissioner** can agree upon a fixed price for **Extra Work** in accordance with Article 25.3.2 or another method of payment for **Extra Work** in accordance with Article 25.3.4, or for **Extra Work** ordered in connection with omitted **Work**, such method, subject to pre-audit by the **EAO**, may, at the option of the **Commissioner**, be substituted for the cost plus a percentage method provided in Article 26.2; provided, however, that if the **Extra Work** is performed by a **Subcontractor**, the **Contractor** shall not be entitled to receive more than an additional allowance of five (5%) percent for overhead and profit over

the cost of such **Subcontractor's Work** as computed in accordance with Article 26.2.

ARTICLE 27. RESOLUTION OF DISPUTES

27.1 All disputes between the **City** and the **Contractor** of the kind delineated in this Article 27.1 that arise under, or by virtue of, this **Contract** shall be finally resolved in accordance with the provisions of this Article 27 and the **PPB** Rules. This procedure for resolving all disputes of the kind delineated herein shall be the exclusive means of resolving any such disputes.

27.1.1 This Article 27 shall not apply to disputes concerning matters dealt with in other sections of the **PPB** Rules, or to disputes involving patents, copyrights, trademarks, or trade secrets (as interpreted by the courts of New York State) relating to proprietary rights in computer software.

27.1.2 This Article 27 shall apply only to disputes about the scope of **Work** delineated by the **Contract**, the interpretation of **Contract** documents, the amount to be paid for **Extra Work** or disputed work performed in connection with the **Contract**, the conformity of the **Contractor's Work** to the **Contract**, and the acceptability and quality of the **Contractor's Work**; such disputes arise when the **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner** makes a determination with which the **Contractor** disagrees.

27.2 All determinations required by this Article 27 shall be made in writing clearly stated, with a reasoned explanation for the determination based on the information and evidence presented to the party making the determination. Failure to make such determination within the time required by this Article 27 shall be deemed a non-determination without prejudice that will allow application to the next level.

27.3 During such time as any dispute is being presented, heard, and considered pursuant to this Article 27, the **Contract** terms shall remain in force and the **Contractor** shall continue to perform **Work** as directed by the **ACCO** or the **Engineer**. Failure of the **Contractor** to continue **Work** as directed shall constitute a waiver by the **Contractor** of its claim.

27.4 Presentation of Disputes to **Commissioner**.

Notice of Dispute and Agency Response. The **Contractor** shall present its dispute in writing ("Notice of Dispute") to the **Commissioner** within thirty (30) Days of receiving written notice of the determination or action that is the subject of the dispute. This notice requirement shall not be read to replace any other notice requirements contained in the **Contract**. The Notice of Dispute shall include all the facts, evidence, documents, or other basis upon which the **Contractor** relies in support of its position, as well as a detailed computation demonstrating how any amount of money claimed by the **Contractor** inthe dispute was arrived at. Within thirty (30) Days after receipt of the detailed written submission comprising the complete Notice of Dispute, the **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner** shall submit to the **Commissioner** all materials he or she deems pertinent to the dispute. Following initial submissions to the **Commissioner**, either party may demand of the other the production of any document or other material the demanding party believes may be relevant to the dispute. The requested party shall produce all relevant materials that are not otherwise protected by a legal privilege recognized by the courts of New York State. Any question of relevancy shall be determined by the **Commissioner** whose decision shall be final. Willful failure of the **Contractor** to produce any requested material whose relevancy the **Contractor** has not disputed, or whose relevancy has been affirmatively determined, shall constitute a waiver by the **Contractor** of its claim.

27.4.1 **Commissioner** Inquiry. The **Commissioner** shall examine the material and may, in his or her discretion, convene an informal conference with the **Contractor**, the **ACCO**, and the **Engineer**, **Resident Engineer**, **Engineering Audit Officer**, or other designee of the **Commissioner** to resolve the issue by mutual consent prior to reaching a determination. The **Commissioner** may seek such technical or other expertise as he or she shall deem appropriate, including the use of neutral mediators, and require any such additional material from either or both parties as he or she deems fit. The **Commissioner's** ability to render, and the effect of, a decision hereunder shall not be impaired by any negotiations in connection with the dispute presented, whether or not the **Commissioner** participated therein. The **Commissioner** may or, at the request of any party to the dispute, shall compel the participation of any **Other Contractor** with a contract related to the **Work** of this **Contract**, and that **Contractor** shall be bound by the decision of the **Commissioner**. Any **Other Contractor** thus brought into the dispute resolution proceeding shall have the same rights and obligations under this Article 27 as the **Contractor** initiating the dispute.

27.4.2 **Commissioner** Determination. Within thirty (30) **Days** after the receipt of all materials and information, or such longer time as may be agreed to by the parties, the **Commissioner** shall make his or her determination and shall deliver or send a copy of such determination to the **Contractor**, the **ACCO,** and **Engineer**, **Resident Engineer**,**Engineering Audit Officer**, or other designee of the **Commissioner**, as applicable, together with a statement concerning how the decision may be appealed.

27.4.3 Finality of **Commissioner's** Decision. The **Commissioner's** decision shall be final and binding on all parties, unless presented to the Contract Dispute Resolution Board pursuant to this Article 27. The **City** may not take a petition to the Contract Dispute Resolution Board. However, should the **Contractor** take such a petition, the **City** may seek, and the Contract Dispute Resolution Board may render, a determination less favorable to the **Contractor** and more favorable to the **City** than the decision of the **Commissioner**.

27.5 Presentation of Dispute to the **Comptroller**. Before any dispute may be brought by the **Contractor** to the Contract Dispute Resolution Board, the **Contractor** must first present its claim to the **Comptroller** for his or her review, investigation, and possible adjustment.

27.5.1 Time, Form, and Content of Notice. Within thirty (30) **Days** of its receipt of a decision by the **Commissioner,** the **Contractor** shall submit to the **Comptroller** and to the **Commissioner** a Notice of Claim regarding its dispute with the **Agency**. The Notice of Claim shall consist of (i) a brief written statement of the substance of the dispute, the amount of money, if any, claimed and the reason(s) the **Contractor** contends the dispute was wrongly decided by the **Commissioner**; (ii) a copy of the written decision of the **Commissioner**; and (iii) a copy of all materials submitted by the **Contractor** to the **Agency**, including the Notice of Dispute. The **Contractor** may not present to the **Comptroller** any material not presented to the **Commissioner**, except at the request of the **Comptroller**.

27.5.2 Response. Within thirty (30) **Days** of receipt of the Notice of Claim, the **Agency** shall make available to the **Comptroller** a copy of all material submitted by the **Agency** to the **Commissioner** in connection with the dispute. The **Agency** may not present to the **Comptroller** any material not presented to the **Commissioner** except at the request of the **Comptroller**.

27.5.3 **Comptroller** Investigation. The **Comptroller** may investigate the claim in dispute and, in the course of such investigation, may exercise all powers provided in Sections 7-201 and 7-203 of the Administrative Code. In addition, the **Comptroller** may demand of either party, and such party shall provide, whatever additional material the **Comptroller** deems pertinent to the claim, including original business records of the **Contractor**. Willful failure of the **Contractor** to produce within fifteen (15) **Days** any material requested by the **Comptroller** shall constitute a waiver by the **Contractor** of its claim. The **Comptroller** may also schedule an informal conference to be attended by the **Contractor**, **Agency** representatives, and any other personnel desired by the **Comptroller**.

27.5.4 Opportunity of **Comptroller** to Compromise or Adjust Claim. The **Comptroller** shall have forty-five (45) **Days** from his or her receipt of all materials referred to in Article 27.5.3 to investigate the disputed claim. The period for investigation and compromise may be further extended by agreement between the **Contractor** and the **Comptroller**, to a maximum of ninety (90) **Days** from the **Comptroller's** receipt of all materials. The **Contractor** may not present its petition to the Contract Dispute Resolution Board until the period for investigation and compromise delineated in this Article 27.5.4 has expired. In compromising or adjusting any claim hereunder, the **Comptroller** may not revise or disregard the terms of the **Contract** between the parties.

27.6 Contract Dispute Resolution Board. There shall be a Contract Dispute Resolution Board composed of:

27.6.1 The chief administrative law judge of the Office of Administrative Trials and Hearings (OATH) or his/her designated OATH administrative law judge, who shall act as chairperson, and may adopt operational procedures and issue such orders consistent with this Article 27 as may be necessary in the execution of the Contract Dispute Resolution Board's functions, including, but not limited to, granting extensions of time to present or respond to submissions;

27.6.2 The **CCPO** or his/her designee; any designee shall have the requisite background to consider and resolve the merits of the dispute and shall not have participated personally and substantially in the particular matter that is the subject of the dispute or report to anyone who so participated; and

27.6.3 A person with appropriate expertise who is not an employee of the **City**. This person shall be selected by the presiding administrative law judge from a prequalified panel of individuals, established and administered by OATH with appropriate background to act as decision-makers in a dispute. Such individual may not have a contract or dispute with the **City** or be an officer or employee of any company or organization that does, or regularly represents persons, companies, or organizations having disputes with the **City**.

27.7 Petition to the Contract Dispute Resolution Board. In the event the claim has not been settled or adjusted by the **Comptroller** within the period provided in this Article 27, the **Contractor**, within thirty (30) **Days** thereafter, may petition the Contract Dispute Resolution Board to review the

Commissioner's determination.

27.7.1 Form and Content of Petition by **Contractor**. The **Contractor** shall present its dispute to the Contract Dispute Resolution Board in the form of a petition, which shall include (i) a brief written statement of the substance of the dispute, the amount of money, if any, claimed, and the reason(s) the **Contractor** contends the dispute was wrongly decided by the **Commissioner**; (ii) a copy of the written Decision of the **Commissioner,** (iii) copies of all materials submitted by the **Contractor** to the Agency; (iv) a copy of the written decision of the **Comptroller**, if any, and (v) copies of all correspondence with, or written material submitted by the **Contractor**, to the **Comptroller**. The **Contractor** shall concurrently submit four (4) complete sets of the Petition: one set to the **City** Corporation Counsel (Attn: Commercial and Real Estate Litigation Division) and three (3) sets to the Contract Dispute Resolution Board at OATH's offices with proof of service on the **City** Corporation Counsel. In addition, the **Contractor** shall submit a copy of the written statement of the substance of the dispute, cited in (i) above, to both the **Commissioner** and the **Comptroller**.

27.7.2 **Agency** Response. Within thirty (30) **Days** of its receipt of the Petition by the **City** Corporation Counsel, the **Agency** shall respond to the brief written statement of the **Contractor** and make available to the Contract Dispute Resolution Board all material it submitted to the **Commissioner** and **Comptroller**. Three (3) complete copies of the **Agency** response shall be provided to the Contract Dispute Resolution Board and one to the **Contractor**. Extensions of time for submittal of the **Agency** response shall be given as necessary upon a showing of good cause or, upon consent of the parties, for an initial period of up to thirty (30) Days.

27.7.3 Further Proceedings. The Contract Dispute Resolution Board shall permit the **Contractor** to present its case by submission of memoranda, briefs, and oral argument. The Contract Dispute Resolution Board shall also permit the **Agency** to present its case in response to the **Contractor** by submission of memoranda, briefs, and oral argument. If requested by the **City** Corporation Counsel, the **Comptroller** shall provide reasonable assistance in the preparation of the **Agency's** case. Neither the **Contractor** nor the **Agency** may support its case with any documentation or other material that was not considered by the **Comptroller**, unless requested by the Contract Dispute Resolution Board. The Contract Dispute Resolution Board, in its discretion, may seek such technical or other expert advice as it shall deem appropriate and may seek, on its own or upon application of a party, any such additional material from any party as it deems fit. The Contract Dispute Resolution Board, in its discretion, may combine more than one dispute between the parties for concurrent resolution.

27.7.4 Contract Dispute Resolution Board Determination. Within forty-five (45) **Days** of the conclusion of all written submissions and oral arguments, the Contract Dispute Resolution Board shall render a written decision resolving the dispute. In an unusually complex case, the Contract Dispute Resolution Board may render its decision in a longer period, not to exceed ninety (90) **Days**, and shall so advise the parties at the commencement of this period. The Contract Dispute Resolution Board's decision must be consistent with the terms of the **Contract**. Decisions of the Contract Dispute Resolution Board shall only resolve matters before the Contract Dispute Resolution Board and shall not have precedential effect with respect to matters not before the Contract Dispute Resolution Board.

27.7.5 Notification of Contract Dispute Resolution Board Decision. The Contract Dispute Resolution Board shall send a copy of its decision to the **Contractor**, the **ACCO**, the Engineer, the **Comptroller**, the **City** Corporation Counsel, the CCPO, and the **PPB**. A decision in favor of the **Contractor** shall be subject to the prompt payment provisions of the **PPB** Rules. The

Required Payment Date shall be thirty (30) Days after the date the parties are formally notified of the Contract Dispute Resolution Board's decision.

27.7.6 Finality of Contract Dispute Resolution Board Decision. The Contract Dispute Resolution Board's decision shall be final and binding on all parties. Any party may seek review of the Contract Dispute Resolution Board's decision solely in the form of a challenge, filed within four (4) months of the date of the Contract Dispute Resolution Board's decision, in a court of competent jurisdiction of the State of New York, County of New York pursuant to Article 78 of the Civil Practice Law and Rules. Such review by the court shall be limited to the question of whether or not the Contract Dispute Resolution Board's decision was made in violation of lawful procedure, was affected by an error of **Law**, or was arbitrary and capricious or an abuse of discretion. No evidence or information shall be introduced or relied upon in such proceeding that was not presented to the Contract Dispute Resolution Board in accordance with this Article 27.

27.8 Any termination, cancellation, or alleged breach of the **Contract** prior to or during the pendency of any proceedings pursuant to this Article 27 shall not affect or impair the ability of the **Commissioner** or Contract Dispute Resolution Board to make a binding and final decision pursuant to this Article 27.

ARTICLE 28. RECORD KEEPING FOR EXTRA OR DISPUTED WORK OR WORK ON ATIME & MATERIALS BASIS

28.1 While the **Contractor** or any of its **Subcontractors** is performing **Work** on a time and material basis or **Extra Work** on a time and material basis ordered by the **Commissioner** under Article 25, or where the **Contractor** believes that it or any of its **Subcontractors** is performing **Extra Work** but a final determination by **Agency** has not been made, or the **Contractor** or any of its **Subcontractors** is performing disputed **Work** (whether on or off the **Site**), or complying with a determination or order under protest in accordance with Articles 11, 27, and 30, in each such case the **Contractor** shall furnish the **Resident Engineer** daily with three (3) copies of written statements signed by the **Contractor's** representative at the **Site** showing:

28.1.1 The name, trade, and number of each worker employed on such **Work** or engaged in complying with such determination or order, the number of hours employed, and the character of the **Work** each is doing; and

28.1.2 The nature and quantity of any materials, plant and equipment furnished or used in connection with the performance of such **Work** or compliance with such determination or order, and from whom purchased or rented.

28.2 A copy of such statement will be countersigned by the **Resident Engineer**, noting thereon any items not agreed to or questioned, and will be returned to the **Contractor** within two (2) **Days** after submission.

28.3 The **Contractor** and its **Subcontractors**, when required by the **Commissioner**, or the **Comptroller**, shall also produce for inspection, at the office of the **Contractor** or **Subcontractor**, any and all of its books, bid documents, financial statements, vouchers, records, daily job diaries and reports, and cancelled checks, and any other documents relating to showing the nature and quantity of the labor, materials, plant and equipment actually used in the performance of such **Work**, or in complying with such determination or order, and the amounts expended therefor, and shall permit the **Commissioner** and the

Comptroller to make such extracts therefrom, or copies thereof, as they or either of them may desire.

28.4 In connection with the examination provided for herein, the **Commissioner**, upon demand therefor, will produce for inspection by the **Contractor** such records as the **Agency** may have withrespect to such **Extra Work** or disputed **Work** performed under protest pursuant to order of the **Commissioner**, except those records and reports which may have been prepared for the purpose of determining the accuracy and validity of the **Contractor's** claim.

28.5 Failure to comply strictly with these requirements shall constitute a waiver of any claim for extra compensation or damages on account of the performance of such **Work** or compliance with such determination or order.

ARTICLE 29. OMITTED WORK

29.1 If any **Contract Work** in a lump sum **Contract**, or if any part of a lump sum item in a unit price, lump sum, or percentage-bid **Contract** is omitted by the **Commissioner** pursuant to Article 33, the **Contract** price, subject to audit by the EAO, shall be reduced by a pro rata portion of the lump sum bid amount based upon the percent of **Work** omitted subject to Article 29.4. For the purpose of determining the pro rata portion of the lump sum bid amount, the bid breakdown submitted in accordance with Article 41 shall be considered, but shall not be the determining factor.

29.2 If the whole of a lump sum item or units of any other item is so omitted by the **Commissioner** in a unit price, lump sum, or percentage-bid **Contract**, then no payment will be made therefor except as provided in Article 29.4.

29.3 For units that have been ordered but are only partially completed, the unit price shall be reduced by a pro rata portion of the unit price bid based upon the percentage of **Work** omitted subject to Article 29.4.

29.4 In the event the **Contractor**, with respect to any omitted **Work**, has purchased any non-cancelable material and/or equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract**, but not yet incorporated into the **Work**, the **Contractor** shall be paid for such material and/or equipment in accordance with Article 64.2.1(b); provided, however, such payment is contingent upon the **Contractor's** delivery of such material and/or equipment in acceptable condition to a location designated by the **City**.

29.5 The **Contractor** agrees to make no claim for damages or for loss of overhead and profit with regard to any omitted **Work**.

ARTICLE 30. NOTICE AND DOCUMENTATION OF COSTS AND DAMAGES; PRODUCTION OF FINANCIAL RECORDS

30.1 If the **Contractor** shall claim to be sustaining damages by reason of any act or omission of the **City** or its agents, it shall submit to the **Commissioner** within forty-five (45) **Days** from the time such damages are first incurred, and every thirty (30) **Days** thereafter to the extent additional damages are being incurred for the same condition, verified statements of the details and the amounts of such damages, together with documentary evidence of such damages. The **Contractor** may submit any of the above statements within such additional time as may be granted by the **Commissioner** in writing upon written request therefor. Failure of the **Commissioner** to respond in writing to a written request for additional time within thirty (30) **Days** shall be deemed a denial of the request. On failure of the **Contractor** to strictly comply with

the foregoing provisions, such claims shall be deemed waived and no right to recover on such claims shall exist. Damages that the **Contractor** may claim in any action or dispute resolution procedure arising under or by reason of this **Contract** shall not be different from or in excess of the statements and documentation made pursuant to this Article 30. This Article 30.1 does not apply to claims submitted to the **Commissioner** pursuant to Article 11 or to claims disputing a determination under Article 27.

30.2 In addition to the foregoing statements, the **Contractor** shall, upon notice from the **Commissioner**, produce for examination at the **Contractor's** office, by the **Engineer**, **Architect** or **Project Manager**, all of its books of account, bills, invoices, payrolls, subcontracts, time books, daily reports, bank deposit books, bank statements, check books, and cancelled checks, showing all of its acts and transactions in connection with or relating to or arising by reason of this **Contract**, and submit itself and persons in its employment, for examination under oath by any person designated by the **Commissioner** or **Comptroller** to investigate claims made or disputes against the **City** under this **Contract**. At such examination, a duly authorized representative of the **Contractor** may be present.

30.3 In addition to the statements required under Article 28 and this Article 30, the **Contractor** and/or its **Subcontractor** shall, within thirty (30) **Days** upon notice from the **Commissioner** or **Comptroller**, produce for examination at the **Contractor's** and/or **Subcontractor's** office, by a representative of either the **Commissioner** or **Comptroller**, all of its books of account, bid documents, financial statements, accountant workpapers, bills, invoices, payrolls, subcontracts, time books, daily reports, bank deposit books, bank statements, check books, and cancelled checks, showing all of its acts and transactions in connection with or relating to or arising by reason of this **Contract**. Further, the **Contractor** and/or its **Subcontractor** shall submit any person in its employment, for examination under oath by any person designated by the **Commissioner** or **Comptroller** to investigate claims made or disputes against the **City** under this **Contract**. At such examination, a duly authorized representative of the **Contractor** may be present.

30.4 Unless the information and examination required under Article 30.3 is provided by the **Contractor** and/or its **Subcontractor** upon thirty (30) **Days'** notice from the **Commissioner** or **Comptroller**, or upon the **Commissioner's** or **Comptroller's** written authorization to extend the time to comply, the **City** shall be released from all claims arising under, relating to or by reason of this **Contract**, except for sums certified by the **Commissioner** to be due under the provisions of this **Contract**. It is further stipulated and agreed that no person has the power to waive any of the foregoing provisions and that in any action or dispute resolution procedure against the **City** to recover any sum in excess of the sums certified by the **Commissioner** to be due under or by reason of this **Contract**, the **Contractor** must allege in its complaint and prove, at trial or during such dispute resolution procedure, compliance with the provisions of this Article 30.

30.5 In addition, after the commencement of any action or dispute resolution procedure by the **Contractor** arising under or by reason of this **Contract**, the **City** shall have the right to require the **Contractor** to produce for examination under oath, up until the trial of the action or hearing before the Contract Dispute Resolution Board, the books and documents described in Article 30.3 and submit itself and all persons in its employ for examination under oath. If this Article 30 is not complied with as required, then the **Contractor** hereby consents to the dismissal of the action or dispute resolutionprocedure.

CHAPTER VII: POWERS OF THE RESIDENT ENGINEER, THE ENGINEER ORARCHITECT AND THE COMMISSIONER

ARTICLE 31. THE RESIDENT ENGINEER

31.1 The **Resident Engineer** shall have the power to inspect, supervise, and control the performance

of the **Work**, subject to review by the **Commissioner**. The **Resident Engineer** shall not, however, have the power to issue an **Extra Work** order, except as specifically designated in writing bythe **Commissioner**.

ARTICLE 32. THE ENGINEER OR ARCHITECT OR PROJECT MANAGER

32.1 The **Engineer** or **Architect** or **Project Manager**, in addition to those matters elsewhere herein delegated to the **Engineer** and expressly made subject to his/her determination, direction or approval, shall have the power, subject to review by the **Commissioner**:

32.1.1 To determine the amount, quality, and location of the **Work** to be paid for hereunder; and

32.1.2 To determine all questions in relation to the **Work**, to interpret the **Contract Drawings**, **Specifications**, and **Addenda**, and to resolve all patent inconsistencies or ambiguities therein; and

32.1.3 To determine how the **Work** of this **Contract** shall be coordinated with **Work** of **Other Contractors** engaged simultaneously on this **Project**, including the power to suspend any part of the **Work**, but not the whole thereof; and

32.1.4 To make minor changes in the **Work** as he/she deems necessary, provided such changes do not result in a net change in the cost to the **City** or to the **Contractor** of the **Work** to be done under the **Contract**; and

32.1.5 To amplify the **Contract Drawings**, add explanatory information and furnish additional **Specifications** and drawings, consistent with this **Contract**.

32.2 The foregoing enumeration shall not imply any limitation upon the power of the **Engineer** or **Architect** or **Project Manager**, for it is the intent of this **Contract** that all of the **Work** shall generally be subject to his/her determination, direction, and approval, except where the determination, direction or approval of someone other than the **Engineer** or **Architect** or **Project Manager** is expressly called for herein.

32.3 The **Engineer** or **Architect** or **Project Manager** shall not, however, have the power to issuean **Extra Work** order, except as specifically designated in writing by the **Commissioner**.

ARTICLE 33. THE COMMISSIONER

33.1 The **Commissioner**, in addition to those matters elsewhere herein expressly made subject to his/her determination, direction or approval, shall have the power:

33.1.1 To review and make determinations on any and all questions in relation to this **Contract** and its performance; and

33.1.2 To modify or change this **Contract** so as to require the performance of **Extra Work** (subject, however, to the limitations specified in Article 25) or the omission of **Contract Work**; and

33.1.3 To suspend the whole or any part of the **Work** whenever in his/her judgment such suspension is required:

33.1.3(a) In the interest of the **City** generally; or

33.1.3(b) To coordinate the **Work** of the various contractors engaged on this **Project** pursuant to the provisions of Article 12; or

33.1.3(c) To expedite the completion of the entire **Project** even though the completion of this particular **Contract** may thereby be delayed.

ARTICLE 34. NO ESTOPPEL

34.1 Neither the **City** nor any **Agency**, official, agent or employee thereof, shall be bound, precluded or estopped by any determination, decision, approval, order, letter, payment or certificate made or given under or in connection with this **Contract** by the **City**, the **Commissioner**, the **Engineer**, the **Resident Engineer**, or any other official, agent or employee of the **City**, either before or after the final completion and acceptance of the **Work** and payment therefor:

34.1.1 From showing the true and correct classification, amount, quality or character of the **Work** actually done; or that any such determination, decision, order, letter, payment or certificate was untrue, incorrect or improperly made in any particular, or that the **Work**, or any part thereof, does not in fact conform to the requirements of this **Contract**; and

34.1.2 From demanding and recovering from the **Contractor** any overpayment made to it, or such damages as the **City** may sustain by reason of the **Contractor's** failure to perform each and every part of its **Contract**.

CHAPTER VIII: LABOR PROVISIONS

ARTICLE 35. EMPLOYEES

35.1 The **Contractor** and its **Subcontractors** shall not employ on the **Work**:

35.1.1 Anyone who is not competent, faithful and skilled in the **Work** for which he/she shall be employed; and whenever the **Commissioner** shall inform the **Contractor**, in writing, that any employee is, in his/her opinion, incompetent, unfaithful or disobedient, that employee shall be discharged from the **Work** forthwith, and shall not again be employed upon it; or

35.1.2 Any labor, materials or means whose employment, or utilization during the course of this **Contract**, may tend to or in any way cause or result in strikes, work stoppages, delays, suspension of **Work** or similar troubles by workers employed by the **Contractor** or its **Subcontractors**, or by any of the trades working in or about the buildings and premises where **Work** is being performed under this **Contract**, or by **Other Contractors** or their **Subcontractors** pursuant to other contracts, or on any other building or premises owned or operated by the **City**, its **Agencies**, departments, boards or authorities. Any violation by the **Contractor** of this requirement may, upon certification of the **Commissioner**, be considered as proper and sufficient cause for declaring the **Contractor** to be in default, and for the **City** to take action against it as set forth in Chapter X of this **Contract**, or such other article of this **Contract** as the Commissioner may deem proper; or

35.1.3 In accordance with Section 220.3-e of the Labor Law of the State of New York (hereinafter "Labor Law"), the **Contractor** and its **Subcontractors** shall not employ on the **Work** any apprentice, unless he/she is a registered individual, under a bona fide program registered with the New York State Department of Labor. The allowable ratio of apprentices to journey-level workers in any craft classification shall not be greater than the ratio permitted to the **Contractor** as to its work force on any job under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered as above, shall be paid the wage rate determined by the **Comptroller** of the **City** for the classification of **Work** actually performed. The **Contractor** or **Subcontractor** will be required to furnish written evidence of the registration of its program and apprentices as well as all the appropriate ratios and wage rates, for the area of the construction prior to using any apprentices on the **Contract Work**.

35.2 If the total cost of the **Work** under this **Contract** is at least two hundred fifty thousand ($250,000) dollars, all laborers, workers, and mechanics employed in the performance of the C**ontract** on the public work site, either by the **Contractor**, **Subcontractor** or other person doing or contracting to do the whole or a part of the **Work** contemplated by the **Contract**, shall be certified prior to performing any **Work** as having successfully completed a course in construction safety and health approved by the United States Department of Labor's Occupational Safety and Health Administration that is at least ten (10) hours in duration.

35.3 In accordance with Local Law Nos. 30-2012 and 33-2012, codified at sections 6-132 and 12-113 of the Administrative Code, respectively,

35.3.1 The **Contractor** shall not take an adverse personnel action with respect to an officer or employee in retaliation for such officer or employee making a report of information concerning conduct which such officer or employee knows or reasonably believes to involve corruption, criminal activity, conflict of interest, gross mismanagement or abuse of authority by any officer or employee relating to this **Contract** to (a) the Commissioner of the Department of Investigation, (b) a member of the New York City Council, the Public Advocate, or the **Comptroller**, or (c) the **CCPO**, **ACCO**, **Agency** head, or **Commissioner**.

35.3.2 If any of the **Contractor**'s officers or employees believes that he or she has been the subject of an adverse personnel action in violation of Article 35.3.1, he or she shall be entitled to bring a cause of action against the **Contractor** to recover all relief necessary to make him or her whole. Such relief may include but is not limited to: (a) an injunction to restrain continued retaliation, (b) reinstatement to the position such employee would have had but for the retaliation or to an equivalent position, (c) reinstatement of full fringe benefits and seniority rights, (d) payment of two times back pay, plus interest, and (e) compensation for any special damages sustained as a result of the retaliation, including litigation costs and reasonable attorney's fees.

35.3.3 The **Contractor** shall post a notice provided by the **City** in a prominent and accessible place on any site where work pursuant to the **Contract** is performed that contains information about:

35.3.3(a) how its employees can report to the New York City Department of Investigation allegations of fraud, false claims, criminality or corruption arising outof or in connection with the **Contract**; and

35.3.3(b) the rights and remedies afforded to its employees under Administrative Code sections 7-805 (the New York City False Claims Act) and 12-113 (the Whistleblower Protection Expansion Act) for lawful acts taken in connection withthe

reporting of allegations of fraud, false claims, criminality or corruption in connection with the **Contract**.

35.3.4 For the purposes of this Article 35.3, "adverse personnel action" includes dismissal, demotion, suspension, disciplinary action, negative performance evaluation, any action resulting in loss of staff, office space, equipment or other benefit, failure to appoint, failure to promote, or any transfer or assignment or failure to transfer or assign against the wishes of the affected officer or employee.

35.3.5 This Article 35.3 is applicable to all of the **Contractor**'s **Subcontractors** having subcontracts with a value in excess of $100,000; accordingly, the **Contractor** shall include this rider in all subcontracts with a value a value in excess of $100,000.

35.4 Article 35.3 is not applicable to this **Contract** if it is valued at $100,000 or less. Articles 35.3.1, 35.3.2, 35.3.4, and 35.3.5 are not applicable to this **Contract** if it was solicited pursuant to a finding of an emergency.

35.5 Paid Sick Leave Law.

35.5.1 Introduction and General Provisions.

35.5.1(a) The Earned Sick Time Act, also known as the Paid Sick Leave Law ("PSLL"), requires covered employees who annually perform more than 80 hours of work in New York City to be provided with paid sick time[2]. Contractors of the **City** or of other governmental entities may be required to provide sick time pursuant to the PSLL.

35.5.1(b) The PSLL became effective on April 1, 2014, and is codified at Title 20, Chapter 8, of the New York City Administrative Code. It is administered by the City's Department of Consumer Affairs ("DCA"); DCA's rules promulgated under the PSLL are codified at Chapter 7 of Title 6 of the Rules of the City of New York ("Rules").

35.5.1(c) The **Contractor** agrees to comply in all respects with the PSLL and the Rules, and as amended, if applicable, in the performance of this **Contract**. The **Contractor** further acknowledges that such compliance is a material term of this **Contract** and that failure to comply with the PSLL in performance of this **Contract** may result in its termination.

35.5.1(d) The **Contractor** must notify the **Agency Chief Contracting Officer** of the **Agency** with whom it is contracting in writing within ten (10) days of receipt of a complaint (whether oral or written) regarding the PSLL involving the performance of this **Contract**. Additionally, the **Contractor** must cooperate with DCA's education efforts and must comply with DCA's subpoenas and other document demands as set forth in the PSLL and Rules.

35.5.1(e) The PSLL is summarized below for the convenience of the **Contractor**. The **Contractor** is advised to review the PSLL and Rules in their entirety. On the

[2] Pursuant to the PSLL, if fewer than five employees work for the same employer, as determined pursuant to New York City Administrative Code § 20-912(g), such employer has the option of providing such employees uncompensated sick time.

website www.nyc.gov/PaidSickLeave there are links to the PSLL and the associated Rules as well as additional resources for employers, such as Frequently Asked Questions, timekeeping tools and model forms, and an event calendar of upcoming presentations and webinars at which the **Contractor** can get more information about how to comply with the PSLL. The **Contractor** acknowledges that it is responsible for compliance with the PSLL notwithstanding any inconsistent language contained herein.

35.5.2 Pursuant to the PSLL and the Rules: Applicability, Accrual, and Use.

35.5.2(a) An employee who works within the City of New York for more than eighty hours in any consecutive 12-month period designated by the employer as its "calendar year" pursuant to the PSLL ("Year") must be provided sick time. Employers must provide a minimum of one hour of sick time for every 30 hours worked by an employee and compensation for such sick time must be provided at the greater of the employee's regular hourly rate or the minimum wage. Employers are not required to provide more than 40 hours of sick time to an employee in any Year.

35.5.2(b) An employee has the right to determine how much sick time he or she will use, provided that employers may set a reasonable minimum increment for the use of sick time not to exceed four hours per **Day**. In addition, an employee may carry over up to 40 hours of unused sick time to the following Year, provided that no employer is required to allow the use of more than forty hours of sick time in a Year or carry over unused paid sick time if the employee is paid for such unused sick time and the employer provides the employee with at least the legally required amount of paid sick time for such employee for the immediately subsequent Year on the first **Day** of such Year.

35.5.2(c) An employee entitled to sick time pursuant to the PSLL may use sick time for any of the following:

i. such employee's mental illness, physical illness, injury, or health condition or the care of such illness, injury, or condition or such employee's need for medical diagnosis or preventive medical care;
ii. such employee's care of a family member (an employee's child, spouse, domestic partner, parent, sibling, grandchild or grandparent, or the child or parent of an employee's spouse or domestic partner) who has a mental illness, physical illness, injury or health condition or who has a need for medical diagnosis or preventive medical care;
iii. closure of such employee's place of business by order of a public official due to a public health emergency; or
iv. such employee's need to care for a child whose school or childcare providerhas been closed due to a public health emergency.

35.5.2(d) An employer must not require an employee, as a condition of taking sick time, to search for a replacement. However, an employer may require an employee to provide: reasonable notice of the need to use sick time; reasonable documentation that the use of sick time was needed for a reason above if for an absence of more than three consecutive work days; and/or written confirmation that an employee used sick time pursuant to the PSLL. However, an employer may not require documentation specifying the nature of a medical condition or otherwise require disclosure of the details of a medical condition as a condition of providing sick time and health information obtained solely due to an employee's use of sick time pursuant to the PSLL must be treated by the

employer as confidential.

35.5.2(e) If an employer chooses to impose any permissible discretionary requirement as a condition of using sick time, it must provide to all employees a written policy containing those requirements, using a delivery method that reasonably ensures that employees receive the policy. If such employer has not provided its written policy, it may not deny sick time to an employee because of non-compliance with such a policy.

35.5.2(f) Sick time to which an employee is entitled must be paid no later than the payday for the next regular payroll period beginning after the sick time was used.

35.5.3 Exemptions and Exceptions. Notwithstanding the above, the PSLL does not apply to any of the following:

35.5.3(a) an independent contractor who does not meet the definition of employee under section 190(2) of the New York State Labor Law;

35.5.3(b) an employee covered by a valid collective bargaining agreement in effect on April 1, 2014, until the termination of such agreement;

35.5.3(c) an employee in the construction or grocery industry covered by a valid collective bargaining agreement if the provisions of the PSLL are expressly waived in such collective bargaining agreement;

35.5.3(d) an employee covered by another valid collective bargaining agreement if such provisions are expressly waived in such agreement and such agreement provides a benefit comparable to that provided by the PSLL for such employee;

35.5.3(e) an audiologist, occupational therapist, physical therapist, or speech language pathologist who is licensed by the New York State Department of Education and who calls in for work assignments at will, determines his or her own schedule, has the ability to reject or accept any assignment referred to him or her, and is paid an average hourly wage that is at least four times the federal minimum wage;

35.5.3(f) an employee in a work study program under Section 2753 of Chapter 42 of the United States Code;

35.5.3(g) an employee whose work is compensated by a qualified scholarship program as that term is defined in the Internal Revenue Code, Section 117 of Chapter 20 of the United States Code; or

35.5.3(h) a participant in a Work Experience Program (WEP) under section 336-c of the New York State Social Services Law.

35.5.4 Retaliation Prohibited. An employer may not threaten or engage in retaliation against an employee for exercising or attempting in good faith to exercise any right provided by the PSLL. In addition, an employer may not interfere with any investigation, proceeding, or hearing pursuant to the PSLL.

35.5.5 Notice of Rights.

35.5.5(a) An employer must provide its employees with written notice of their rights pursuant to the PSLL. Such notice must be in English and the primary language spoken

by an employee, provided that DCA has made available a translation into such language. Downloadable notices are available on DCA's website at http://www.nyc.gov/html/dca/html/law/PaidSickLeave.shtml.

35.5.5(b) Any person or entity that willfully violates these notice requirements is subject to a civil penalty in an amount not to exceed fifty dollars for each employee who was not given appropriate notice.

35.5.6 Records. An employer must retain records documenting its compliance with the PSLL for a period of at least three years, and must allow DCA to access such records in furtherance of an investigation related to an alleged violation of the PSLL.

35.5.7 Enforcement and Penalties.

35.5.7(a) Upon receiving a complaint alleging a violation of the PSLL, DCA has the right to investigate such complaint and attempt to resolve it through mediation. Within 30 **Days** of written notification of a complaint by DCA, or sooner in certain circumstances, the employer must provide DCA with a written response and such other information as DCA may request. If DCA believes that a violation of the PSLL has occurred, it has the right to issue a notice of violation to the employer.

35.5.7(b) DCA has the power to grant an employee or former employee all appropriate relief as set forth in New York City Administrative Code § 20-924(d). Such relief may include, among other remedies, treble damages for the wages that should have been paid, damages for unlawful retaliation, and damages and reinstatement for unlawful discharge. In addition, DCA may impose on an employer found to have violated the PSLL civil penalties not to exceed $500 for a first violation, $750 for a second violation within two years of the first violation, and
$1,000 for each succeeding violation within two years of the previous violation.

35.5.8 More Generous Polices and Other Legal Requirements. Nothing in the PSLL is intended to discourage, prohibit, diminish, or impair the adoption or retention of a more generous sick time policy, or the obligation of an employer to comply with any contract, collective bargaining agreement, employment benefit plan or other agreement providing more generous sick time. The PSLL provides minimum requirements pertaining to sick time and does not preempt, limit or otherwise affect the applicability of any other law, regulation, rule, requirement, policy or standard that provides for greater accrual or use by employees of sick leave or time, whether paid or unpaid, or that extends other protections to employees. The PSLL may not be construed as creating or imposing any requirement in conflict with any federal or state law, rule or regulation.

35.6 HireNYC: Hiring and Reporting Requirements. This Article 35.6 applies to construction contracts of $1,000,000 or more. The **Contractor** shall comply with the requirements of Articles 35.6.1-35.6.5 for all non-trades jobs (e.g., for an administrative position arising out of **Work** ant located in New York City). The **Contractor** shall reasonably cooperate with SBS and the **City** on specific outreach events, including "Hire-on-the-Spot" events, for the hiring of trades workers in connection with the **Work**. If provided elsewhere in this **Contract**, this **Contract** is subject to a project labor agreement.

35.6.1 Enrollment. The **Contractor** shall enroll with the HireNYC system, found at www.nyc.gov/sbs, within thirty (30) days after the registration of this **Contract** pursuant to Section 328 of the New York City Charter. The **Contractor** shall provide information about the business, designate a primary contact and say whether it intends to hire for any entry

to mid-level job opportunities arising from this **Contract** and located in New York City, and, if so, the approximate start date of the first hire.

35.6.2 Job Posting Requirements.

35.6.2(a) Once enrolled in HireNYC, the **Contractor** agrees to update the HireNYC portal with all entry to mid-level job opportunities arising from this **Contract** and located in New York City, if any, which shall be defined as jobs requiring no more than an associate degree, as provided by the New York State Department of Labor (see Column F of https://labor.ny.gov/stats/2012-2022- NYS- Employment-Prospects.xls). The information to be updated includes the types of entry and mid-level positions made available from the work arising from the **Contract** and located in New York City, the number of positions, the anticipated schedule of initiating the hiring process for these positions, and the contact information for the **Contractor's** representative charged with overseeing hiring. The **Contractor** must update the HireNYC portal with any hiring needs arising from the contract and located in New York City, and the requirements of the jobs to be filled, no less than three weeks prior to the intended first day of employment for each new position, except with the permission of SBS, not to be unreasonably withheld, and must also update the HireNYC portal as set forth below.

35.6.2(b) After enrollment through HireNYC and submission of relevant information, SBS will work with the **Contractor** to develop a recruitment plan which will outline the candidate screening process, and will provide clear instructions as to when, where, and how interviews will take place. HireNYC will screen applicants based on employer requirements and refer applicants whom it believes are qualified to the **Contractor** for interviews. The **Contractor** must interview referred applicants whom it believes are qualified.

35.6.2(c) After completing an interview of a candidate referred by HireNYC, the **Contractor** must provide feedback via the portal within twenty (20) business days to indicate which candidates were interviewed and hired, if any. In addition, the **Contractor** shall provide the start date of new hires, and additional information reasonably related to such hires, within twenty (20) business days after the start date. In the event the **Contractor** does not have any job openings covered by this Rider in any given year, the **Contractor** shall be required to provide an annual update to HireNYC to that effect. For this purpose, the reporting year shall run from the date of the registration of the **Contract** pursuant to Charter section 328 and each anniversary date.

35.6.2(d) These requirements do not limit the **Contractor's** ability to assess the qualifications of prospective workers, and to make final hiring and retention decisions. No provision of this Article 35.6 shall be interpreted so as to require the **Contractor** to employ any particular worker.

35.6.2(e) In addition, the provisions of this Article 35.6 shall not apply to positions that the **Contractor** intends to fill with employees employed pursuant to the job retention provision of Section 22-505 of the Administrative Code of the City of New York. The **Contractor** shall not be required to report such openings with HireNYC. However, the **Contractor** shall enroll with the HireNYC system pursuant to Article 35.6.1, above, and, if such positions subsequently become open, then the remaining provisions of this Article 35.6 will apply.

35.6.3 Breach and Liquidated Damages. If the **Contractor** fails to comply with the termsof the **ContrSact** and this Article 35.6 (l) by not enrolling its business with HireNYC; (2) by not informing HireNYC, as required, of open positions; or (3) by failing to interview a qualified candidate, the **Agency** may assess liquidated damages in the amount of two- thousand five hundred dollars ($2,500) per breach. For all other events of noncompliance with the terms of this Article 35.6, the **Agency** may assess liquidated damages in the amount of five hundred dollars ($500) per breach. Furthermore, in the event the **Contractor** breaches the requirements of this Article 35.6 during the term of the **Contract**, the **City** may hold the **Contractor** in default of this **Contract**.

35.6.4 Audit Compliance. In addition to the auditing requirements set forth in other partsof the **Contract**, the **Contractor** shall permit SBS and the **City** to inspect any and all records concerning or relating to job openings or the hiring of individuals for work arising from the **Contract** and located in New York City. The **Contractor** shall permit an inspection within seven (7) business days of the request.

35.6.5 Other Reporting Requirements. The **Contractor** shall report to the **City**, on amonthly basis, all information reasonably requested by the **City** that is necessary for the **City** to comply with any reporting requirements imposed by **Law**, including any requirement that the **City** maintain a publicly accessible database. In addition, the **Contractor** agrees to comply with all reporting requirements imposed by **Law**, or as otherwise requested by the **City**.

35.6.6 Federal Hiring Requirements. If this **Contract** is federally funded (as indicated elsewhere in this Contract), the **Contractor** shall comply with all federal hiring requirements as may be set forth in this **Contract**, including, as applicable: (a) Section 3 of the HUD Act of 1968, which requires, to the greatest extent feasible, economic opportunities for 30 percent of new hires be given to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing and Executive Order 11246, which prohibits discrimination in employment due to race, color, religion,sex or national origin, and requires the implementation of goals for minority and female participation for work involving any construction trade.

ARTICLE 36. NO DISCRIMINATION

36.1 The **Contractor** specifically agrees, as required by Labor Law Section 220-e, as amended, that:

36.1.1 In the hiring of employees for the performance of **Work** under this **Contract** or any subcontract hereunder, neither the **Contractor**, **Subcontractor**, nor any person acting on behalf of such **Contractor** or **Subcontractor**, shall by reason of race, creed, color or national origin discriminate against any citizen of the State of New York who is qualifiedand available to perform the **Work** to which the employment relates;

36.1.2 Neither the **Contractor**, **Subcontractor**, nor any person on its behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of **Work** under this **Contract** on account of race, creed, color or national origin;

36.1.3 There may be deducted from the amount payable to the **Contractor** by the **City** under this **Contract** a penalty of fifty ($50.00) dollars for each person for each **Day** during which such person was discriminated against or intimidated in violation of the provisions of this

Contract; and

36.1.4 This **Contract** may be cancelled or terminated by the **City** and all moneys due or to become due hereunder may be forfeited, for a second or any subsequent violation of the terms or conditions of this Article 36.

36.1.5 This Article 36 covers all construction, alteration and repair of any public building or public work occurring in the State of New York and the manufacture, sale, and distribution of materials, equipment, and supplies to the extent that such operations are performed within the State of New York pursuant to this **Contract**.

36.2 The **Contractor** specifically agrees, as required by Section 6-108 of the Administrative Code,as amended, that:

36.2.1 It shall be unlawful for any person engaged in the construction, alteration or repairof buildings or engaged in the construction or repair of streets or highways pursuant to a **Contract** with the **City** or engaged in the manufacture, sale or distribution of materials, equipment or supplies pursuant to a **Contract** with the **City** to refuse to employ or to refuse to continue in any employment any person on account of the race, color or creed of such person.

36.2.2 It shall be unlawful for any person or any servant, agent or employee of any person, described in Article 36.1.2, to ask, indicate or transmit, orally or in writing, directly or indirectly, the race, color or creed or religious affiliation of any person employed or seeking employment from such person, firm or corporation.

36.2.3 Breach of the foregoing provisions shall be deemed a violation of a material provision of this **Contract**.

36.2.4 Any person, or the employee, manager or owner of or officer of such firm or corporation who shall violate any of the provisions of this Article 36.2 shall, upon conviction thereof, be punished by a fine of not more than one hundred ($100.00) dollars or by imprisonment for not more than thirty (30) **Days**, or both.

36.3 This **Contract** is subject to the requirements of Executive Order No. 50 (1980) ("E.O. 50"), as revised, and the rules and regulations promulgated thereunder. No contract will be awarded unless and until these requirements have been complied with in their entirety. By signing this **Contract**, the **Contractor** agrees that it:

36.3.1 Will not engage in any unlawful discrimination against any employee or applicantfor employment because of race, creed, color, national origin, sex, age, disability, marital status or sexual orientation with respect to all employment decisions including, but not limited to, recruitment, hiring, upgrading, demotion, downgrading, transfer, training, ratesof pay or other forms of compensation, layoff, termination, and all other terms and conditions of employment; and

36.3.2 Will not engage in any unlawful discrimination in the selection of **Subcontractors** on the basis of the owner's race, color, creed, national origin, sex, age, disability, marital status or sexual orientation; and

36.3.3 Will state in all solicitations or advertisements for employees placed by or on behalf of the **Contractor** that all qualified applicants will receive consideration for employment without unlawful discrimination based on race, creed, color, national origin, sex, age, citizens status,

disability, marital status, sexual orientation, or that it is an equal employment opportunity employer; and

36.3.4 Will send to each labor organization or representative of workers with which it has a collective bargaining agreement or other contract or memorandum of understanding, written notification of its equal employment opportunity commitments under E.O. 50 and the rules and regulations promulgated thereunder; and

36.3.5 Will furnish, before the award of the **Contract**, all information and reports, including an employment report, that are required by E.O. 50, the rules and regulations promulgated thereunder, and orders of the **City** Department of Business Services, Division of Labor Services (**DLS**) and will permit access to its books, records, and accounts by the **DLS** for the purposes of investigation to ascertain compliance with such rules, regulations, and orders.

36.4 The **Contractor** understands that in the event of its noncompliance with the nondiscrimination clauses of this **Contract** or with any of such rules, regulations, or orders, such noncompliance shall constitute a material breach of this **Contract** and noncompliance with E.O. 50 and the rules and regulations promulgated thereunder. After a hearing held pursuant to the rules of the **DLS**, the Director of the **DLS** may direct the **Commissioner** to impose any or all of the following sanctions:

36.4.1 Disapproval of the **Contractor**; and/or

36.4.2 Suspension or termination of the **Contract**; and/or

36.4.3 Declaring the **Contractor** in default; and/or

36.4.4 In lieu of any of the foregoing sanctions, the Director of the **DLS** may impose an employment program.

In addition to any actions taken under this **Contract**, failure to comply with E.O. 50 and the rules and regulations promulgated thereunder, in one or more instances, may result in a **City Agency** declaring the **Contractor** to be non-responsible in future procurements. The **Contractor** further agrees that it will refrain from entering into any **Contract** or **Contract** modification subject to E.O. 50 and the rules and regulations promulgated thereunder with a **Subcontractor** who is not in compliance with the requirements of E.O. 50 and the rules and regulations promulgated thereunder.

36.5 The **Contractor** specifically agrees, as required by Section 6-123 of the AdministrativeCode, that:

36.5.1 The **Contractor** will not engage in any unlawful discriminatory practice in violation of Title 8 of the Administrative Code; and

36.5.2 Any failure to comply with this Article 36.5 may subject the **Contractor** to the remedies set forth in Section 6-123 of the Administrative Code, including, where appropriate, sanctions such as withholding of payment, imposition of an employment program, finding the **Contractor** to be in default, cancellation of the **Contract**, or any other sanction or remedy provided by **Law** or **Contract**.

ARTICLE 37. LABOR LAW REQUIREMENTS

37.1 The **Contractor** shall strictly comply with all applicable provisions of the Labor Law, as

amended. Such compliance is a material term of this **Contract**.

37.2 The **Contractor** specifically agrees, as required by Labor Law Sections 220 and 220-d, as amended, that:

37.2.1 Hours of **Work**: No laborer, worker, or mechanic in the employ of the **Contractor**, **Subcontractor** or other person doing or contracting to do the whole or a part of the **Work** contemplated by this **Contract** shall be permitted or required to work more than eight (8) hours in any one (1) **Day**, or more than five (5) **Days** in any one (1) week, except as provided in the Labor Law and in cases of extraordinary emergency including fire, flood, or danger to life or property, or in the case of national emergency when so proclaimed by the President of the United States of America.

37.2.2 In situations in which there are not sufficient laborers, workers, and mechanics who may be employed to carry on expeditiously the **Work** contemplated by this **Contract** as a result of such restrictions upon the number of hours and **Days** of labor, and the immediate commencement or prosecution or completion without undue delay of the **Work** is necessary for the preservation of the **Site** and/or for the protection of the life and limb of the persons using the same, such laborers, workers, and mechanics shall be permitted or required to work more than eight (8) hours in any one (1) **Day**; or five (5) **Days** in any one (1) week; provided, however, that upon application of any **Contractor**, the **Commissioner** shall have first certified to the Commissioner of Labor of the State of New York (hereinafter "Commissioner of Labor") that such public **Work** is of an important nature and that a delay in carrying it to completion would result in serious disadvantage to the public; and provided, further, that such Commissioner of Labor shall have determined that such an emergency does in fact exist as provided in Labor Law Section 220.2.

37.2.3 Failure of the **Commissioner** to make such a certification to the Commissioner of Labor shall not entitle the **Contractor** to damages for delay or for any cause whatsoever.

37.2.4 Prevailing Rate of Wages: The wages to be paid for a legal day's **Work** to laborers, workers, or mechanics employed upon the **Work** contemplated by this **Contract** or upon any materials to be used thereon shall not be less than the "prevailing rate of wage" as defined in Labor Law Section 220, and as fixed by the **Comptroller** in the attached Schedule of Wage Rates and in updated schedules thereof. The prevailing wage rates and supplemental benefits to be paid are those in effect at the time the **Work** is being performed.

37.2.5 Requests for interpretation or correction in the Information for Bidders includes all requests for clarification of the classification of trades to be employed in the performance of the **Work** under this **Contract**. In the event that a trade not listed in the **Contract** is in fact employed during the performance of this **Contract**, the **Contractor** shall be required to obtain from the **Agency** the prevailing wage rates and supplementary benefits for the trades used and to complete the performance of this **Contract** at the price at which the **Contract** was awarded.

37.2.6 Minimum Wages: Except for employees whose wage is required to be fixed pursuant to Labor Law Section 220, all persons employed by the **Contractor** and any **Subcontractor** in the manufacture or furnishing of the supplies, materials, or equipment, or the furnishing of work, labor, or services, used in the performance of this **Contract**, shall be paid, without subsequent deduction or rebate unless expressly authorized by **Law**, not less than the sum mandated by **Law**.

37.3 Working Conditions: No part of the **Work**, labor or services shall be performed or rendered by

the **Contractor** in any plants, factories, buildings or surroundings or under working conditions which are unsanitary or hazardous or dangerous to the health and safety of employees engaged in the performance of this **Contract**. Compliance with the safety, sanitary, and factory inspection **Laws** of the state in which the **Work** is to be performed shall be prima facie evidence of compliance with this Article 37.3.

37.4 Prevailing Wage Enforcement: The **Contractor** agrees to pay for all costs incurred by the **City** in enforcing prevailing wage requirements, including the cost of any investigation conducted by or on behalf of the **Agency** or the **Comptroller,** where the **City** discovers a failure to comply with any of the requirements of this Article 37 by the **Contractor** or its **Subcontractor(s)**. The **Contractor** also agrees that, should it fail or refuse to pay for any such investigation, the **Agency** is hereby authorized to deduct from a **Contractor's** account an amount equal to the cost of such investigation.

37.4.1 The Labor Law Section 220 and Section 220-d, as amended, provide that this **Contract** shall be forfeited and no sum paid for any **Work** done hereunder on a second conviction for willfully paying less than:

37.4.1(a) The stipulated prevailing wage scale as provided in Labor Law section 220, as amended, or

37.4.1(b) The stipulated minimum hourly wage scale as provided in Labor Law section 220-d, as amended.

37.4.2 For any breach or violation of either working conditions (Article 37.3) or minimum wages (Article 37.2.6) provisions, the party responsible therefor shall be liable to the **City** for liquidated damages, which may be withheld from any amounts due on any contracts with the **City** of such party responsible, or may be recovered in actions brought by the **City** Corporation Counsel in the name of the **City**, in addition to damages for any other breach of this **Contract**, for a sum equal to the amount of any underpayment of wages due to any employee engaged in the performance of this **Contract**. In addition, the **Commissioner** shall have the right to cancel contracts and enter into other contracts for the completion of the original contract, with or without public letting, and the original **Contractor** shall be liable for any additional cost. All sums withheld or recovered as deductions, rebates, refunds, or underpayment of wages hereunder, shall be held in a special deposit account and shall be paid without interest, on order of the **Comptroller**, directly to the employees who have been paid less than minimum rates of pay as set forth herein and on whose account such sums were withheld or recovered, provided that no claims by employees for such payments shall be entertained unless made within two (2) years from the date of actual notice to the **Contractor** of the withholding or recovery of such sums by the **City**.

37.4.3 A determination by the **Comptroller** that a **Contractor** and/or its **Subcontractor** willfully violated Labor Law Section 220 will be forwarded to the **City's** five District Attorneys for review.

37.4.4 The **Contractor's** or **Subcontractor's** noncompliance with this Article 37.4 and Labor Law Section 220 may result in an unsatisfactory performance evaluation and the **Comptroller** may also find and determine that the **Contractor** or **Subcontractor** willfully violated the New York Labor **Law**.

37.4.4(a) An unsatisfactory performance evaluation for noncompliance with this Article 37.4 may result in a determination that the **Contractor** is a non-responsible bidder on subsequent procurements with the **City** and thus a rejection of a future award

of a contract with the **City**, as well as any other sanctions provided for by**Law**.

37.4.4(b) Labor Law Section 220-b, as amended, provides that when two (2) final determinations have been rendered against a **Contractor** or **Subcontractor** within any consecutive six (6) year period determining that such **Contractor** or **Subcontractor** has willfully failed to pay the prevailing rate of wages or to provide supplements in accordance with the Labor Law and this Article 37.4, whether such failures were concurrent or consecutive and whether or not such final determinations concerning separate public works projects are rendered simultaneously, such **Contractor** or **Subcontractor** shall be ineligible to submit a bid on or be awarded any public works contract with the **City** for a period of five (5) years from the second final determination. If the final determination involves the falsification of payroll records or the kickback of wages or supplements, the **Contractor** or **Subcontractor** shall be ineligible to submit a bid on or be awarded any public works contract with the **City** for a period of five (5) years from the first final determination.

37.4.4(c) Labor Law Section 220, as amended, provides that the **Contractor** or **Subcontractor** found to have violated this Article 37.4 may be directed to make payment of wages or supplements including interest found to be due, and the **Contractor** or **Subcontractor** may be directed to make payment of a further sum asa civil penalty in an amount not exceeding twenty-five (25%) percent of the total amount found to be due.

37.5 The **Contractor** and its **Subcontractors** shall within ten (10) **Days** after mailing of a Noticeof Award or written order, post in prominent and conspicuous places in each and every plant, factory, building, and structure where employees of the **Contractor** and its **Subcontractors** engaged in the performance of this **Contract** are employed, notices furnished by the **City**, in relation to prevailing wages and supplements, minimum wages, and other stipulations contained in Sections 220 and 220-h of the Labor Law, and the **Contractor** and its **Subcontractors** shall continue to keep such notices posted in such prominent and conspicuous places until **Final Acceptance** of the supplies, materials, equipment, or **Work**, labor, or services required to be furnished or rendered under this **Contract**.

37.6 The **Contractor** shall strictly comply with all of the provisions of Articles 37.6.1 through 37.6.5, and provide for all workers, laborers or mechanics in its employ, the following:

37.6.1 Notices Posted At **Site**: Post, in a location designated by the **City**, schedules of prevailing wages and supplements for this **Project**, a copy of all re-determinations of such schedules for the **Project**, the Workers' Compensation **Law** Section 51 notice, all other notices required by **Law** to be posted at the **Site**, the **City** notice that this **Project** is a public works project on which each worker is entitled to receive the prevailing wages and supplements for the occupation at which he or she is working, and all other notices whichthe **City** directs the **Contractor** to post. The **Contractor** shall provide a surface for such notices which is satisfactory to the **City**. The **Contractor** shall maintain and keep current such notices in a legible manner and shall replace any notice or schedule which is damaged, defaced, illegible or removed for any reason. The **Contractor** shall post such notices before commencing any **Work** on the **Site** and shall maintain such notices until all **Work**on the **Site** is complete; and

37.6.2 Daily **Site** Sign-in Sheets: Maintain daily **Site** sign-in sheets, and require that **Subcontractors** maintain daily **Site** sign-in sheets for its employees, which include blank spaces for an employee's name to be both printed and signed, job title, date started and Social Security number, the time the employee began work and the time the employee left

work, until **Final Acceptance** of the supplies, materials, equipment, or **Work**, labor, or services to be furnished or rendered under this **Contract** unless exception is granted by the **Comptroller** upon application by the **Agency**. In the alternative, subject to the approval of the **CCPO**, the **Contractor** and **Subcontractor** may maintain an electronic or biometric sign-in system, which provides the information required by this Article 37.6.2; and

37.6.3 Individual Employee Information Notices: Distribute a notice to each worker, laborer or mechanic employed under this **Contract**, in a form provided by the **Agency**, that this **Project** is a public works project on which each worker, laborer or mechanic is entitled to receive the prevailing rate of wages and supplements for the occupation at which he orshe is working. If the total cost of the **Work** under this **Contract** is at least two hundred fifty thousand ($250,000) dollars, such notice shall also include a statement that each worker, laborer or mechanic must be certified prior to performing any **Work** as having successfully completed a course in construction safety and health approved by the United States Department of Labor's Occupational Safety and Health Administration that is at least ten (10) hours in duration. Such notice shall be distributed to each worker before he or she starts performing any **Work** of this **Contract** and with the first paycheck after July first of each year. "Worker, laborer or mechanic" includes employees of the **Contractor** and all **Subcontractors** and all employees of suppliers entering the **Site**. At the time of distribution, the **Contractor** shall have each worker, laborer or mechanic sign a statement, in a form provided by the **Agency**, certifying that the worker has received the notice required by this Article 37.6.3, which signed statement shall be maintained with the payroll records required by this **Contract**; and

37.6.3(a) The **Contractor** and each **Subcontractor** shall notify each worker, laborer or mechanic employed under this **Contract** in writing of the prevailing rate of wages for their particular job classification. Such notification shall be given to every worker, laborer, and mechanic on their first pay stub and with every pay stub thereafter; and

37.6.4 **Site** Laminated Identification Badges: The **Contractor** shall provide laminated identification badges which include a photograph of the worker's, laborer's or mechanic's face and indicate the worker's, laborer's or mechanic's name, trade, employer's name, and employment starting date (month/day/year). Further, the **Contractor** shall require as acondition of employment on the **Site**, that each and every worker, laborer or mechanic wear the laminated identification badge at all times and that it may be seen by any representative of the **City**. The **Commissioner** may grant a written waiver from the requirement that the laminated identification badge include a photograph if the **Contractor** demonstrates that the identity of an individual wearing a laminated identification badge can be easily verified by another method; and

37.6.5 Language Other Than English Used On **Site**: Provide the **ACCO** notice when three (3) or more employees (worker and/or laborer and/or mechanic) on the **Site**, at any time, speak a language other than English. The **ACCO** will then provide the **Contractor** the notices described in Article 37.6.1 in that language or languages as may be required. The **Contractor** is responsible for all distributions under this Article 37; and

37.6.6 Provision of Records: The **Contractor** and **Subcontractor(s)** shall produce within five (5) **Days** on the **Site** of the **Work** and upon a written order of the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, or the **Comptroller,** such records as are required to be kept by this Article 37.6; and

37.6.7 The **Contractor** and **Subcontractor(s)** shall pay employees by check or direct deposit. If this **Contract** is for an amount greater than one million ($1,000,000) dollars, checks issued by the **Contractor** to covered employees shall be generated by a payroll service or automated payroll system (an in-house system may be used if approved by the **Agency**). For any subcontract for an amount greater than seven hundred fifty thousand ($750,000) dollars, checks issued by a **Subcontractor** to covered employees shall be generated by a payroll service or automated payroll system (an in-house system may be usedif approved by the **Agency**); and

37.6.8 The failure of the **Contractor** or **Subcontractor(s)** to comply with the provisions of Articles 37.6.1 through 37.6.7 may result in the **Commissioner** declaring the **Contractor** in default and/or the withholding of payments otherwise due under the **Contract**.

37.7 The **Contractor** and its **Subcontractors** shall keep such employment and payroll records as are required by Section 220 of the Labor Law. The failure of the **Contractor** or **Subcontractor(s)** to comply with the provisions of this Article 37.7 may result in the **Commissioner** declaring the **Contractor** in default and/or the withholding of payments otherwise due under the **Contract.**

37.8 At the time the **Contractor** makes application for each partial payment and for final payment, the **Contractor** shall submit to the **Commissioner** a written payroll certification, in the form provided by this **Contract**, of compliance with the prevailing wage, minimum wage, and other provisions and stipulations required by Labor Law Section 220 and of compliance with the training requirements of Labor Law Section 220-h set forth in Article 35.2. This certification of compliance shall be a condition precedent to payment and no payment shall be made to the **Contractor** unless and until each such certification shall have been submitted to and received by the **Commissioner**.

37.9 This **Contract** is executed by the **Contractor** with the express warranty and representation that the **Contractor** is not disqualified under the provisions of Section 220 of the Labor Law from the award of the **Contract**.

37.10 Any breach or violation of any of the foregoing shall be deemed a breach or violation of a material provision of this **Contract**, and grounds for cancellation thereof by the **City**.

ARTICLE 38. PAYROLL REPORTS

38.1 The **Contractor** and its **Subcontractor(s)** shall maintain on the **Site** during the performanceof the **Work** the original payrolls or transcripts thereof which the **Contractor** and its **Subcontractor(s)** are required to maintain and shall submit such original payrolls or transcripts, subscribed and affirmed by it as true, within thirty (30) **Days** after issuance of its first payroll, and every thirty (30) **Days** thereafter, pursuant to Labor Law Section 220(3-a)(a)(iii). The **Contractor** and **Subcontractor(s)** shall submit such original payrolls or transcripts along with each and every payment requisition. If payment requisitions are not submitted at least once a month, the **Contractor** and its **Subcontractor(s)** shall submit original payrolls and transcripts both along with its payment requisitions and independently of its payment requisitions.

38.2 The **Contractor** shall maintain payrolls or transcripts thereof for six (6) years from the date of completion of the **Work** on this **Contract**. If such payrolls and transcripts are maintained outside of New York City after the completion of the **Work** and their production is required pursuant to this Article 38, the **Contractor** shall produce such records in New York City upon request by the City.

38.3 The **Contractor** and **Subcontractor(s)** shall comply with any written order, direction, or request made by the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law**

Investigator(s), or the **Comptroller**, to provide to the requesting party any of the following information and/or records within five (5) **Days** of such written order, direction, or request:

38.3.1 Such original payrolls or transcripts thereof subscribed and affirmed by it as true and the statements signed by each worker pursuant to this Chapter VIII; and/or

38.3.2 Attendance sheets for each **Day** on which any employee of the **Contractor** and/or any of the **Subcontractor(s)** performed **Work** on the **Site**, which attendance sheet shall be in a form acceptable to the **Agency** and shall provide information acceptable to the **Agency** to identify each such employee; and/or

38.3.3 Any other information to satisfy the **Engineer**, the **Commissioner**, the **ACCO**, the **Agency EAO**, the **Agency Labor Law Investigator(s)** or the **Comptroller**, that this Chapter VIII and the Labor Law, as to the hours of employment and prevailing rates of wages and/or supplemental benefits, are being observed.

38.4 The failure of the **Contractor** or **Subcontractor(s)** to comply with the provisions of Articles 38.1 and/or 38.2 may result in the **Commissioner** declaring the **Contractor** in default and/or the withholding of payments otherwise due under the **Contract**.

ARTICLE 39. DUST HAZARDS

39.1 Should a harmful dust hazard be created in performing the **Work** of this **Contract**, for the elimination of which appliances or methods have been approved by the Board of Standards and Appeals of the City of New York, such appliances and methods shall be installed, maintained, and effectively operated during the continuance of such harmful dust hazard. Failure to comply with this provision after notice shall make this **Contract** voidable at the sole discretion of the **City**.

CHAPTER IX: PARTIAL AND FINAL PAYMENTS

ARTICLE 40. CONTRACT PRICE

40.1 The **City** shall pay, and the **Contractor** agrees to accept, in full consideration for the **Contractor's** performance of the **Work** subject to the terms and conditions hereof, the lump sum priceor unit prices for which this **Contract** was awarded, plus the amount required to be paid for any **Extra Work** ordered by the **Commissioner** under Article 25, less credit for any **Work** omitted pursuant to Article 29.

ARTICLE 41. BID BREAKDOWN ON LUMP SUM

41.1 Within fifteen (15) **Days** after the commencement date specified in the **Notice to Proceed** or **Order to Work**, unless otherwise directed by the **Resident Engineer**, the **Contractor** shall submitto the **Resident Engineer** a breakdown of its bid price, or of lump sums bid for items of the **Contract**, showing the various operations to be performed under the **Contract**, as directed in the progress schedule required under Article 9, and the value of each of such operations, the total of such items to equal the lump sum price bid. Said breakdown must be approved in writing by the **Resident Engineer**.

41.2 No partial payment will be approved until the **Contractor** submits a bid breakdown that is acceptable to the **Resident Engineer**.

41.3 The **Contractor** shall also submit such other information relating to the bid breakdown as directed by the **Resident Engineer**. Thereafter, the breakdown may be used only for checking the **Contractor's** applications for partial payments hereunder, but shall not be binding upon the **City**, the **Commissioner**, or the **Engineer** for any purpose whatsoever.

ARTICLE 42. PARTIAL PAYMENTS

42.1 From time to time as the **Work** progresses satisfactorily, but not more often than once each calendar month (except where the **Commissioner** approves in writing the submission of invoices on a more frequent basis and for invoices relating to **Work** performed pursuant to a change order), the **Contractor** may submit to the **Engineer** a requisition for a partial payment in the prescribed form, which shall contain an estimate of the quantity and the fair value of the **Work** done during the payment period.

42.2 Partial payments may be made for materials, fixtures, and equipment in advance of their actual incorporation in the **Work**, as the **Commissioner** may approve, and upon the terms and conditions set forth in the General Conditions.

42.3 The **Contractor** shall also submit to the **Commissioner** in connection with every application for partial payment a verified statement in the form prescribed by the **Comptroller** setting forth the information required under Labor Law Section 220-a.

42.4 Within thirty (30) **Days** after receipt of a satisfactory payment application, and within sixty (60) **Days** after receipt of a satisfactory payment application in relation to **Work** performed pursuant to a change order, the **Engineer** will prepare and certify, and the **Commissioner** will approve, a voucher for a partial payment in the amount of such approved estimate, less any and all deductions authorized to be made by the **Commissioner** under the terms of this **Contract** or by **Law**.

ARTICLE 43. PROMPT PAYMENT

43.1 The Prompt Payment provisions of the **PPB** Rules in effect at the time of the bid will be applicable to payments made under this **Contract**. The provisions require the payment to the **Contractor** of interest on payments made after the required payment date, except as set forth in the **PPB** Rules.

43.2 The **Contractor** shall submit a proper invoice to receive payment, except where the **Contract** provides that the **Contractor** will be paid at predetermined intervals without having to submit an invoice for each scheduled payment.

43.3 Determination of interest due will be made in accordance with the **PPB** Rules.

43.4 If the **Contractor** is paid interest, the proportionate share(s) of that interest shall be forwarded by the **Contractor** to its **Subcontractor(s)**.

43.5 The **Contractor** shall pay each **Subcontractor** or **Materialman** not later than seven (7) **Days** after receipt of payment out of amounts paid to the **Contractor** by the **City** for **Work** performed by the **Subcontractor** or **Materialman** under this **Contract**.

43.5.1 If **Contractor** fails to make any payment to any **Subcontractor** or **Materialman** within seven (7) **Days** after receipt of payment by the **City** pursuant to this Article 43.5,

then the **Contractor** shall pay interest on amounts due to such **Subcontractor** or **Materialman** at the rate of interest in effect on the date such payment is made by the **Contractor** computed in accordance with Section 756-b (1)(b) of the New York General Business Law. Accrual of interest shall commence on the **Day** immediately following the expiration of the seventh **Day** following receipt of payment by the **Contractor** from the **City** and shall end on the date on which payment is made.

43.6 The **Contractor** shall include in each of its subcontracts a provision requiring each **Subcontractor** to make payment to each of its **Subcontractors** or **Materialmen** for **Work** performed under this **Contract** in the same manner and within the same time period set forth above.

ARTICLE 44. SUBSTANTIAL COMPLETION PAYMENT

44.1 The **Contractor** shall submit with the **Substantial Completion** requisition:

44.1.1 A final verified statement of any pending Article 27 disputes in accordance with the **PPB** Rules and this **Contract** and any and all alleged claims against the **City**, in any way connected with or arising out of this **Contract** (including those as to which details may have been furnished pursuant to Articles 11, 27, 28, and 30) setting forth with respect to each such claim the total amount thereof, the various items of labor and materials included therein, and the alleged value of each item; and if the alleged claim be one for delay, the alleged cause of each such delay, the period or periods of time, giving the dates when the **Contractor** claims the performance of the **Work** or a particular part thereof was delayed,and an itemized statement and breakdown of the amount claimed for each such delay.

44.1.1(a) With respect to each such claim, the **Commissioner**, the **Comptroller** and, in the event of litigation, the **City** Corporation Counsel shall have the same right to inspect, and to make extracts or copies of, the **Contractor's** books, vouchers, records, etc., as is referred to in Articles 11, 27, 28, and 30. Nothing contained in this Article 44.1.1(a) is intended to or shall relieve the **Contractor** from the obligation of complying strictly with Articles 11, 27, 28, and 30. The **Contractor** is warned that unless such claims are completely set forth as herein required, the **Contractor** upon acceptance of the **Substantial Completion** payment pursuant to this Article 44, will have waived any such claims.

44.1.2 A **Final Approved Punch List**.

44.1.3 Where required, a request for an extension of time to achieve **Substantial Completion** or final extension of time.

44.2 The **Commissioner** shall issue a voucher calling for payment of any part or all of the balance due for **Work** performed under the **Contract**, including monies retained under Article 21, less any and all deductions authorized to be made by the **Commissioner**, under this **Contract** or by **Law**, and less twice the amount the **Commissioner** considers necessary to ensure the completion of the balance of the **Work** by the **Contractor**. Such a payment shall be considered a partial and not a final payment. No **Substantial Completion** payment shall be made under this Article 44 where the **Contractor** failed to complete the **Work** within the time fixed for such completion in the Schedule A of the General Conditions, or within the time to which completion may have been extended, until an extension or extensions of time for the completion of **Work** have been acted upon pursuant to Article 13.

44.3 No further partial payments shall be made to the **Contractor** after **Substantial Completion**, except the **Substantial Completion** payment and payment pursuant to any **Contractor's** requisition that were properly filed with the **Commissioner** prior to the date of **Substantial Completion**; however, the **Commissioner** may grant a waiver for further partial payments after the date of **Substantial Completion** to permit payments for change order **Work** and/or release of retainage and deposits pursuant to Articles 21 and 24. Such waiver shall be in writing.

44.4 The **Contractor** acknowledges that nothing contained in this Article 44 is intended to or shall in any way diminish the force and effect of Article 13.

ARTICLE 45. FINAL PAYMENT

45.1 After completion and **Final Acceptance** of the **Work**, the **Contractor** shall submit all required certificates and documents, together with a requisition for the balance claimed to be due under the **Contract**, less the amount authorized to be retained for maintenance under Article 24. Such submission shall be within 90 days of the date of the **Commissioner's** written determination of **Final Acceptance**, or within such additional time as may be granted by the **Commissioner** in writing. If the **Contractor** fails to submit all required certificates and documents within the time allowed, no payment of the balance claimed shall be made to the **Contractor** and the **Contractor** shall be deemed to have forfeited its right to payment of any balance claimed. A verified statement similar to that required in connection with applications for partial payments shall also be submitted to the **Commissioner**.

45.2 Amended Verified Statement of Claims: The **Contractor** shall also submit with the final requisition any amendments to the final verified statement of any pending dispute resolution procedures in accordance with the **PPB** Rules and this **Contract** and any and all alleged claims against the **City**, in any way connected with or arising out of this **Contract** (including those as to which details may have been furnished pursuant to Articles 11, 27, 28, and 30) that have occurred subsequent to **Substantial Completion**, setting forth with respect to each such claim the total amount thereof, the various items of labor and materials included therein, and the alleged value of each such item; and if the alleged claim be one for delay, the alleged cause of each such delay, the period or periods of time, giving the dates when the **Contractor** claims the performance of the **Work** or a particular part thereof was delayed, and an itemized statement and breakdown of the amount claimed for each such delay. With reference to each such claim, the **Commissioner**, the **Comptroller** and, in the event of litigation, the **City** Corporation Counsel shall have the same right to inspect, and to make extracts or copies of, the **Contractor's** books, vouchers, records, etc., as is referred to in Articles 11, 27, 28, and 30. Nothing contained in this Article 45.2, is intended to or shall relieve the **Contractor** from the obligation of complying strictly with Articles 11, 27, 28, and 30. The **Contractor** is warned that unless such claims are completely set forth as herein required, the **Contractor**, upon acceptance of the Final Payment pursuant to Article 46, will have waived any such claims.

45.3 Preparation of Final Voucher: Upon determining the balance due hereunder other than on account of claims, the **Engineer** will prepare and certify, for the Commissioner's approval, a voucher for final payment in that amount less any and all deductions authorized to be made by the **Commissioner** under this **Contract** or by **Law**. In the case of a lump sum **Contract**, the **Commissioner** shall certify the voucher for final payment within thirty (30) **Days** from the date of completion and acceptance of the **Work**, provided all requests for extensions of time have been acted upon.

45.3.1 All prior certificates and vouchers upon which partial payments were made, being merely estimates made to enable the **Contractor** to prosecute the **Work** more advantageously, shall be subject to correction in the final voucher, and the certification of the **Engineer**

thereon and the approval of the **Commissioner** thereof, shall be conditions precedent to the right of the **Contractor** to receive any money hereunder. Such final voucher shall be binding and conclusive upon the **Contractor**.

45.3.2 Payment pursuant to such final voucher, less any deductions authorized to be made by the **Commissioner** under this **Contract** or by **Law**, shall constitute the final payment, and shall be made by the **Comptroller** within thirty (30) **Days** after the filing of such voucher in his/her office.

45.4 The **Contractor** acknowledges that nothing contained in this Article 45 is intended to or shall in any way diminish the force and effect of Article 13.

ARTICLE 46. ACCEPTANCE OF FINAL PAYMENT

46.1 The acceptance by the **Contractor**, or by anyone claiming by or through it, of the final payment, whether such payment be made pursuant to any judgment of any court, or otherwise, shall constitute and operate as a release of the **City** from any and all claims of and liability to the **Contractor** for anything heretofore done or furnished for the **Contractor** relating to or arising out of this **Contract** and the **Work** done hereunder, and for any prior act, neglect or default on the part of the **City** or any of its officials, agents or employees, excepting only a claim against the **City** for the amounts deducted or retained in accordance with the terms and provisions of this **Contract** or by **Law**, and excepting any claims, not otherwise waived, or any pending dispute resolution procedures which are contained in the verified statement filed with the **Contractor's** substantial and final requisitions pursuant to Articles 44and 45.

46.2 The **Contractor** is warned that the execution by it of a release, in connection with the acceptance of the final payment, containing language purporting to reserve claims other than those herein specifically excepted from the operation of this Article 46, or those for amounts deducted by the **Commissioner** from the final requisition or from the final payment as certified by the **Engineer** and approved by the **Commissioner**, shall not be effective to reserve such claims, anything stated to the **Contractor** orally or in writing by any official, agent or employee of the **City** to the contrary notwithstanding.

46.3 Should the **Contractor** refuse to accept the final payment as tendered by the **Comptroller**, it shall constitute a waiver of any right to interest thereon.

46.4 The **Contractor**, however, shall not be barred by this Article 46 from commencing an action for breach of **Contract** to the extent permitted by **Law** and by the terms of the **Contract** for any claims that are contained in the verified statement filed with the **Contractor's** substantial and final requisitions pursuant to Articles 44 and 45 or that arose after submission of the final payment requisition, provided that a detailed and verified statement of claim is served upon the contracting **Agency** and **Comptroller** not later than forty (40) **Days** after the making of such final payment by electronic funds transfer (EFT)or the mailing of such final payment. The statement shall specify the items upon which the claim will be based and any such claim shall be limited to such items.

ARTICLE 47. APPROVAL BY PUBLIC DESIGN COMMISSION

47.1 All works of art, including paintings, mural decorations, stained glass, statues, bas-reliefs, and other sculptures, monuments, fountains, arches, and other structures of a permanent character intendedfor ornament or commemoration, and every design of the same to be used in the performance of this **Contract**, and the design of all bridges, approaches, buildings, gates, fences, lamps, or structures to be erected, pursuant

to the terms of this **Contract**, shall be submitted to the Art Commission, d/b/a the Public Design Commission of the City of New York, and shall be approved by the Public Design Commission prior to the erection or placing in position of the same. The final payment shall not become due or payable under this **Contract** unless and until the Public Design Commission shall certify that the design for the **Work** herein contracted for has been approved by the said Public Design Commission, and that the same has been executed in substantial accordance with the design so approved, pursuant to the provisions of Chapter 37, Section 854 of the **City** Charter, as amended.

CHAPTER X: CONTRACTOR'S DEFAULT

ARTICLE 48. COMMISSIONER'S RIGHT TO DECLARE CONTRACTOR IN DEFAULT

48.1 In addition to those instances specifically referred to in other Articles herein, the **Commissioner** shall have the right to declare the **Contractor** in default of this **Contract** if:

48.1.1 The **Contractor** fails to commence **Work** when notified to do so by the **Commissioner**; or if

48.1.2 The **Contractor** shall abandon the **Work**; or if

48.1.3 The **Contractor** shall refuse to proceed with the **Work** when and as directed by the **Commissioner**; or if

48.1.4 The **Contractor** shall, without just cause, reduce its working force to a number which, if maintained, would be insufficient, in the opinion of the **Commissioner**, to complete the **Work** in accordance with the progress schedule; or if

48.1.5 The **Contractor** shall fail or refuse to increase sufficiently such working force when ordered to do so by the **Commissioner**; or if

48.1.6 The **Contractor** shall sublet, assign, transfer, convert or otherwise dispose of this **Contract** other than as herein specified; or sell or assign a majority interest in the **Contractor**; or if

48.1.7 The **Contractor** fails to secure and maintain all required insurance; or if

48.1.8 A receiver or receivers are appointed to take charge of the **Contractor's** property or affairs; or if

48.1.9 The **Commissioner** shall be of the opinion that the **Contractor** is or has been unnecessarily or unreasonably or willfully delaying the performance and completion of the **Work**, or the award of necessary subcontracts, or the placing of necessary material and equipment orders; or if

48.1.10 The **Commissioner** shall be of the opinion that the **Contractor** is or has been willfully or in bad faith violating any of the provisions of this **Contract**; or if

48.1.11 The **Commissioner** shall be of the opinion that the **Work** cannot be completed within the time herein provided therefor or within the time to which such completion may have been extended; provided, however, that the impossibility of timely completion is, in the

Commissioner's opinion, attributable to conditions within the **Contractor's** control; orif

48.1.12 The **Work** is not completed within the time herein provided therefor or within the time to which the **Contractor** may be entitled to have such completion extended; or if

48.1.13 Any statement or representation of the **Contractor** in the **Contract** or in any document submitted by the **Contractor** with respect to the **Work**, the **Project**, or the **Contract** (or for purposes of securing the **Contract**) was untrue or incorrect when made; or if

48.1.14 The **Contractor** or any of its officers, directors, partners, five (5%) percent shareholders, principals, or other persons substantially involved in its activities, commits any of the acts or omissions specified as the grounds for debarment in the **PPB** Rules.

48.2 Before the **Commissioner** shall exercise his/her right to declare the **Contractor** in default, the **Commissioner** shall give the **Contractor** an opportunity to be heard, upon not less than two (2) **Days**' notice.

ARTICLE 49. EXERCISE OF THE RIGHT TO DECLARE DEFAULT

49.1 The right to declare the **Contractor** in default for any of the grounds specified or referred to in Article 48 shall be exercised by sending the **Contractor** a notice, signed by the **Commissioner**, setting forth the ground or grounds upon which such default is declared (hereinafter referred to as a "Notice of Default").

49.2 The **Commissioner's** determination that the **Contractor** is in default shall be conclusive, final, and binding on the parties and such a finding shall preclude the **Contractor** from commencing a plenary action for any damages relating to the **Contract**. If the **Contractor** protests the determination of the **Commissioner**, the **Contractor** may commence an action in a court of competent jurisdiction of the State of New York under Article 78 of the New York Civil Practice Law and Rules.

ARTICLE 50. QUITTING THE SITE

50.1 Upon receipt of such notice the **Contractor** shall immediately discontinue all further operations under this **Contract** and shall immediately quit the **Site**, leaving untouched all plant, materials, equipment, tools, and supplies then on the **Site**.

ARTICLE 51. COMPLETION OF THE WORK

51.1 The **Commissioner**, after declaring the **Contractor** in default, may then have the **Work** completed by such means and in such manner, by contract with or without public letting, or otherwise, as he/she may deem advisable, utilizing for such purpose such of the **Contractor's** plant, materials, equipment, tools, and supplies remaining on the **Site**, and also such **Subcontractors**, as he/she may deem advisable.

51.2 After such completion, the **Commissioner** shall make a certificate stating the expense incurred in such completion, which shall include the cost of re-letting and also the total amount of liquidated damages (at the rate provided for in the **Contract**) from the date when the **Work** should have been completed by the **Contractor** in accordance with the terms hereof to the date of actual completion of the **Work**. Such certificate shall be binding and conclusive upon the **Contractor**, its sureties, and any person claiming under the **Contractor**, as to the amount thereof.

51.3 The expense of such completion, including any and all related and incidental costs, as so certified by the **Commissioner**, and any liquidated damages assessed against the **Contractor**, shall be charged against and deducted out of monies which are earned by the **Contractor** prior to the date of default. Should the expense of such completion, as certified by the **Commissioner**, exceed the total sum which would have been payable under the **Contract** if it had been completed by the **Contractor**, any excess shall be paid by the **Contractor**.

ARTICLE 52. PARTIAL DEFAULT

52.1 In case the **Commissioner** shall declare the **Contractor** in default as to a part of the **Work** only, the **Contractor** shall discontinue such part, shall continue performing the remainder of the **Work**in strict conformity with the terms of this **Contract**, and shall in no way hinder or interfere with any **Other Contractor(s)** or persons whom the **Commissioner** may engage to complete the **Work** as to which the **Contractor** was declared in default.

52.2 The provisions of this Chapter relating to declaring the **Contractor** in default as to the entire **Work** shall be equally applicable to a declaration of partial default, except that the **Commissioner** shallbe entitled to utilize for completion of the part of the **Work** as to which the **Contractor** was declared in default only such plant, materials, equipment, tools, and supplies as had been previously used by the **Contractor** on such part.

ARTICLE 53. PERFORMANCE OF UNCOMPLETED WORK

53.1 In completing the whole or any part of the **Work** under the provisions of this Chapter X, the **Commissioner** shall have the power to depart from or change or vary the terms and provisions of this **Contract**, provided, however, that such departure, change or variation is made for the purpose ofreducing the time or expense of such completion. Such departure, change or variation, even to the extent of accepting a lesser or different performance, shall not affect the conclusiveness of the **Commissioner's** certificate of the cost of completion referred to in Article 51, nor shall it constitute a defense to an action to recover the amount by which such certificate exceeds the amount which would have been payable to the **Contractor** hereunder but for its default.

ARTICLE 54. OTHER REMEDIES

54.1 In addition to the right to declare the **Contractor** in default pursuant to this Chapter X, the **Commissioner** shall have the absolute right, in his/her sole discretion and without a hearing, to complete or cause to be completed in the same manner as described in Articles 51 and 53, any or all unsatisfactory or uncompleted punch list **Work** that remains after the completion date specified in the **Final Approved Punch List**. A written notice of the exercise of this right shall be sent to the **Contractor** who shall immediately quit the **Site** in accordance with the provisions of Article 50.

54.2 The expense of completion permitted under Article 54.1, including any and all related and incidental costs, as so certified by the **Commissioner**, shall be charged against and deducted out of monies which have been earned by the **Contractor** prior to the date of the exercise of the right set forthin Article 54.1; the balance of such monies, if any, subject to the other provisions of this **Contract**, to be paid to the **Contractor** without interest after such completion. Should the expense of such completion,as certified by

the **Commissioner**, exceed the total sum which would have been payable under the **Contract** if it had been completed by the **Contractor**, any excess shall be paid by the **Contractor**.

54.3 The previous provisions of this Chapter X shall be in addition to any and all other remedies available under **Law** or in equity.

54.4 The exercise by the **City** of any remedy set forth herein shall not be deemed a waiver by the **City** of any other legal or equitable remedy contained in this **Contract** or provided under **Law**.

CHAPTER XI: MISCELLANEOUS PROVISIONS

ARTICLE 55. CONTRACTOR'S WARRANTIES

55.1 In consideration of, and to induce, the award of this **Contract** to the **Contractor**, the **Contractor** represents and warrants:

55.1.1 That it is financially solvent, sufficiently experienced and competent to performthe **Work**; and

55.1.2 That the facts stated in its bid and the information given by it pursuant to the Information for Bidders is true and correct in all respects; and

55.1.3 That it has read and complied with all requirements set forth in the **Contract**.

ARTICLE 56. CLAIMS AND ACTIONS THEREON

56.1 Any claim, that is not subject to dispute resolution under the **PPB** Rules or this **Contract**, against the **City** for damages for breach of **Contract** shall not be made or asserted in any action, unless the **Contractor** shall have strictly complied with all requirements relating to the giving of notice and of information with respect to such claims, as herein before provided.

56.2 Nor shall any action be instituted or maintained on any such claims unless such action is commenced within six (6) months after **Substantial Completion**; except that:

56.2.1 Any claims arising out of events occurring after **Substantial Completion** and before **Final Acceptance** of the **Work** shall be asserted within six (6) months of **Final Acceptance** of the **Work**;

56.2.2 If the **Commissioner** exercises his/her right to complete or cause to complete any or all unsatisfactory or uncompleted punch list **Work** that remains after the completion date specified in the **Final Approved Punch List** pursuant to Article 54, any such action shall be commenced within six (6) months from the date the **Commissioner** notifies the **Contractor** in writing that he/she has exercised such right. Any claims for monies deducted, retained or withheld under the provisions of this **Contract** shall be assertedwithin six (6) months after the date when such monies otherwise become due and payable hereunder; and

56.2.3 If the **Commissioner** exercises his/her right to terminate the **Contract** pursuant to Article 64, any such action shall be commenced within six (6) months of the date the **Commissioner** exercises said right.

ARTICLE 57. INFRINGEMENT

57.1 The **Contractor** shall be solely responsible for and shall defend, indemnify, and hold the **City** harmless from any and all claims (even if the allegations of the lawsuit are without merit) and judgments for damages and from costs and expenses to which the **City** may be subject to or which it may suffer or incur allegedly arising out of or in connection with any infringement by the **Contractor** of any copyright, trade secrets, trademark or patent rights or any other property or personal right of any third party by the **Contractor** and/or its **Subcontractors** in the performance or completion of the **Work**. Insofar as thefacts or **Law** relating to any claim would preclude the **City** from being completely indemnified by the **Contractor**, the **City** shall be partially indemnified by the **Contractor** to the fullest extent permitted by **Law**.

ARTICLE 58. NO CLAIM AGAINST OFFICIALS, AGENTS OR EMPLOYEES

58.1 No claim whatsoever shall be made by the **Contractor** against any official, agent or employeeof the **City** for, or on account of, anything done or omitted to be done in connection with this **Contract**.

ARTICLE 59. SERVICE OF NOTICES

59.1 The **Contractor** hereby designates the business address, fax number, and email addressspecified in its bid, as the place where all notices, directions or other communications to the **Contractor** may be delivered, or to which they may be mailed. Any notice, direction, or communication from either party to the other shall be in writing and shall be deemed to have been given when (i) delivered personally; (ii) sent by certified mail, return receipt requested; (iii) delivered by overnight or same day courier service in a properly addressed envelope with confirmation; or (iv) sent by fax or email and,unless receipt of the fax or e-mail is acknowledged by the recipient by fax or e-mail, deposited in a post office box regularly maintained by the United States Postal Service in a properly addressed, postage pre- paid envelope.

59.2 **Contractor's** notice address, email address, or fax number may be changed at any time by an instrument in writing, executed and acknowledged by the **Contractor**, and delivered to the**Commissioner**.

59.3 Nothing herein contained shall, however, be deemed to preclude or render inoperative the service of any notice, direction or other communication upon the **Contractor** personally, or, if the **Contractor** is a corporation, upon any officer thereof.

ARTICLE 60. UNLAWFUL PROVISIONS DEEMED STRICKEN FROM CONTRACT

60.1 If this **Contract** contains any unlawful provision not an essential part of the **Contract** and which shall not appear to have been a controlling or material inducement to the making thereof, the same shall be deemed of no effect and shall, upon notice by either party, be deemed stricken from the **Contract** without affecting the binding force of the remainder.

ARTICLE 61. ALL LEGAL PROVISIONS DEEMED INCLUDED

61.1 It is the intent and understanding of the parties to this **Contract** that each and every provision of **Law** required to be inserted in this **Contract** shall be and is inserted herein. Furthermore, it is hereby stipulated that every such provision is to be deemed to be inserted herein, and if, through mistake or otherwise, any such provision is not inserted, or is not inserted in correct form, then this **Contract** shall forthwith upon the application of either party be amended by such insertion so as to comply strictly with the **Law** and without prejudice to the rights of either party hereunder.

ARTICLE 62. TAX EXEMPTION

62.1 The **City** is exempt from payment of Federal, State, and local taxes, including sales and compensating use taxes of the State of New York and its cities and counties on all tangible personal property sold to the **City** pursuant to the provisions of this **Contract**. These taxes are not to be included in bids. However, this exemption does not apply to tools, machinery, equipment or other property leased by or to the **Contractor**, **Subcontractor** or **Materialman** or to tangible personal property which, even though it is consumed, is not incorporated into the completed **Work** (consumable supplies) and tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**. The **Contractor** and its **Subcontractors** and **Materialmen** shall be responsible for and pay any and all applicable taxes, including sales and compensating use taxes, on such leased tools, machinery, equipment or other property and upon all such consumable supplies and tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**.

62.2 The **Contractor** agrees to sell and the **City** agrees to purchase all tangible personal property, other than consumable supplies and other tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work**, that is required, necessary or proper for or incidental to the construction of the **Project** covered by this **Contract**. The sum paid under this **Contract** for such tangible personal property shall be in full payment and consideration for the sale of such tangible personal property.

> 62.2.1 The **Contractor** agrees to construct the **Project** and to perform all **Work**, labor and services rendered, necessary, proper or incidental thereto for the sum shown in the bid forthe performance of such **Work**, labor, and services, and the sum so paid pursuant to this **Contract** for such **Work**, labor, and services, shall be in full consideration for the performance by the **Contractor** of all its duties and obligations under this **Contract** in connection with said **Work,** labor, and services.

62.3 20 NYCRR Section 541.3(d) provides that a **Contractor**'s purchases of tangible personal property that is either incorporated into real property owned by a governmental entity or purchased for and sold to a governmental entity are exempt from sales and use tax. The **City** shall not pay sales tax for any such tangible personal property that it purchases from the **Contractor** pursuant to the **Contract.** With respect to such tangible personal property, the **Contractor**, at the request of the **City**, shall furnish to the **City** such bills of sale and other instruments as may be required by the **City**, properly executed, acknowledged and delivered assuring to the **City** title to such tangible personal property, free of liens and/or encumbrances, and the **Contractor** shall mark or otherwise identify all such tangible personal property as the property of the **City**.

62.4 Title to all tangible personal property to be sold by the **Contractor** to the **City** pursuant to the provisions of the **Contract** shall immediately vest in and become the sole property of the **City** upon delivery of such tangible personal property to the **Site**. Notwithstanding such transfer of title, the **Contractor** shall

have the full and continuing responsibility to install such tangible personal property in accordance with the provisions of this **Contract**, protect it, maintain it in a proper condition and forthwith repair, replace and make good any damage thereto, theft or disappearance thereof, and furnish additional tangible personal property in place of any that may be lost, stolen or rendered unusable, without cost to the **City**, until such time as the **Work** covered by the **Contract** is fully accepted by the **City**. Such transfer of title shall in no way affect any of the **Contractor's** obligations hereunder. In the event that, after title has passed to the **City**, any of the tangible personal property is rejected as being defective or otherwise unsatisfactory, title to all such tangible personal property shall be deemed to have been transferred back to the **Contractor**.

62.5 The purchase by **Subcontractors** or **Materialmen** of tangible personal property to be sold hereunder shall be a purchase or procurement for resale to the **Contractor** (either directly or through other **Subcontractors**) and therefore not subject to the aforesaid sales and compensating use taxes, provided that the subcontracts and purchase agreements provide for the resale of such tangible personal property and that such subcontracts and purchase agreements are in a form similar to this **Contract** with respect to the separation of the sale of consumable supplies and tangible personal property that the **Contractor** is required to remove from the **Site** during or upon completion of the **Work** from the **Work** and labor, services, and any other matters to be provided, and provided further that the subcontracts and purchase agreements provide separate prices for tangible personal property and all other services and matters. Such separation shall actually be followed in practice, including the separation of payments for tangible personal property from the payments for other **Work** and labor and other things to be provided.

62.6 The **Contractor** and its **Subcontractors** and **Materialmen** shall furnish a **Contractor** Exempt Purchase Certificate to all persons, firms or corporations from which they purchase tangible personal property for the performance of the **Work** covered by this **Contract**.

62.7 In the event any of the provisions of this Article 62 shall be deemed to be in conflict with any other provisions of this **Contract** or create any ambiguity, then the provisions of this Article 62 shall control.

ARTICLE 63. INVESTIGATION(S) CLAUSE

63.1 The parties to this **Contract** agree to cooperate fully and faithfully with any investigation, audit or inquiry conducted by a United States, a State of New York (State) or a **City** governmental agency or authority that is empowered directly or by designation to compel the attendance of witnesses and to examine witnesses under oath, or conducted by the Inspector General of a governmental agency that is a party in interest to the transaction, submitted bid, submitted proposal, contract, lease, permit or license that is the subject of the investigation, audit or inquiry.

63.2 If any person who has been advised that his/her statement, and any information from such statement, will not be used against him/her in any subsequent criminal proceeding refuses to testify before a grand jury or other governmental agency or authority empowered directly or by designation to compel the attendance of witnesses and to examine witnesses under oath concerning the award of or performance under any transaction, agreement, lease, permit, contract, or license entered into with the **City**, the State, or any political subdivision or public authority thereof, or the Port Authority of NewYork and New Jersey, or any local development corporation within the **City**, or any public benefit corporation organized under the **Laws** of the State of New York, or;

63.3 If any person refuses to testify for a reason other than the assertion of his/her privilege against self incrimination in an investigation, audit or inquiry conducted by a **City** or State governmental agency or authority empowered directly or by designation to compel the attendance of witnesses and to take testimony under oath, or by the Inspector General of the governmental agency that is a party in interestin, and is

seeking testimony concerning the award of, or performance under any transaction, agreement, lease, permit, contract, or license entered into with the **City**, the State, or any political subdivision thereof or any local development corporation within the **City**, then;

63.4 The **Commissioner** whose **Agency** is a party in interest to the transaction, submitted bid, submitted proposal, contract, lease, permit, or license shall convene a hearing, upon not less than five (5) **Days**' written notice to the parties involved to determine if any penalties should attach for the failure of a person to testify.

63.5 If any non-governmental party to the hearing requests an adjournment, the **Commissioner** who convened the hearing may, upon granting the adjournment, suspend any contract, lease, permit, or license, pending the final determination pursuant to Article 63.7 without the **City** incurring any penalty or damages for delay or otherwise.

63.6 The penalties which may attach after a final determination by the **Commissioner** may include but shall not exceed:

63.6.1 The disqualification for a period not to exceed five (5) years from the date of an adverse determination for any person, or any entity of which such person was a member at the time the testimony was sought, from submitting bids for, or transacting business with, or entering into or obtaining any contract, lease, permit or license with or from the **City**; and/or

63.6.2 The cancellation or termination of any and all such existing **City** contracts, leases, permits or licenses that the refusal to testify concerns and that have not been assigned as permitted under this **Contract**, nor the proceeds of which pledged, to an unaffiliated and unrelated institutional lender for fair value prior to the issuance of the notice scheduling the hearing, without the **City** incurring any penalty or damages on account of such cancellation or termination; monies lawfully due for goods delivered, work done, rentals, or fees accrued prior to the cancellation or termination shall be paid by the **City**.

63.7 The **Commissioner** shall consider and address in reaching his/her determination and inassessing an appropriate penalty the factors in Articles 63.7.1 and 63.7.2. The **Commissioner** may also consider, if relevant and appropriate, the criteria established in Articles 63.7.3 and 63.7.4, in addition to any other information which may be relevant and appropriate:

63.7.1 The party's good faith endeavors or lack thereof to cooperate fully and faithfully with any governmental investigation or audit, including but not limited to the discipline, discharge, or disassociation of any person failing to testify, the production of accurate and complete books and records, and the forthcoming testimony of all other members, agents, assignees or fiduciaries whose testimony is sought.

63.7.2 The relationship of the person who refused to testify to any entity that is a party tothe hearing, including but not limited to, whether the person whose testimony is sought has an ownership interest in the entity and/or the degree of authority and responsibility theperson has within the entity.

63.7.3 The nexus of the testimony sought to the subject entity and its contracts, leases, permits or licenses with the **City**.

63.7.4 The effect a penalty may have on an unaffiliated and unrelated party or entity thathas a significant interest in an entity subject to penalties under Article 63.6, provided that the party

or entity has given actual notice to the **Commissioner** upon the acquisition of the interest, or at the hearing called for in Article 63.4, gives notice and proves that such interest was previously acquired. Under either circumstance the party or entity shall present evidence at the hearing demonstrating the potential adverse impact a penalty will have on such person or entity.

63.8 Definitions:

63.8.1 The term "license" or "permit" as used in this Article 63 shall be defined as a license, permit, franchise or concession not granted as a matter of right.

63.8.2 The term "person" as used in this Article 63 shall be defined as any natural person doing business alone or associated with another person or entity as a partner, director, officer, principal or employee.

63.8.3 The term "entity" as used in this Article 63 shall be defined as any firm, partnership, corporation, association, joint venture, or person that receives monies, benefits, licenses, leases, or permits from or through the **City** or otherwise transacts business with the **City**.

63.8.4 The term "member" as used in this Article 63 shall be defined as any person associated with another person or entity as a partner, director, officer, principal or employee.

63.9 In addition to and notwithstanding any other provision of this **Contract**, the **Commissioner** may in his/her sole discretion terminate this **Contract** upon not less than three (3) **Days'** written notice in the event the **Contractor** fails to promptly report in writing to the **Commissioner** of the Department of Investigations ("DOI") of the **City** any solicitation of money, goods, requests for future employment or other benefit or thing of value, by or on behalf of any employee of the **City** or other person, firm, corporation or entity for any purpose which may be related to the procurement or obtaining of this **Contract** by the **Contractor**, or affecting the performance of this **Contract**.

ARTICLE 64. TERMINATION BY THE CITY

64.1 In addition to termination pursuant to any other article of this **Contract**, the **Commissioner** may, at any time, terminate this **Contract** by written notice to the **Contractor**. In the event of termination, the **Contractor** shall, upon receipt of such notice, unless otherwise directed by the **Commissioner**:

64.1.1 Stop **Work** on the date specified in the notice;

64.1.2 Take such action as may be necessary for the protection and preservation of the **City's** materials and property;

64.1.3 Cancel all cancelable orders for material and equipment;

64.1.4 Assign to the **City** and deliver to the **Site** or another location designated by the **Commissioner**, any non-cancelable orders for material and equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract** and not incorporated in the **Work**;

64.1.5 Take no action which will increase the amounts payable by the **City** under this
64.1.5 **Contract**.

64.2 In the event of termination by the **City** pursuant to this Article 64, payment to the **Contractor** shall be in accordance with Articles 64.2.1, 64.2.2 or 64.2.3, to the extent that each respective article applies.

64.2.1 Lump Sum Contracts or Items: On all lump sum **Contracts**, or on lump sum items in a **Contract**, the **City** will pay the **Contractor** the sum of the amounts described in Articles 64.2.1(a) and 64.2.1(b), less all payments previously made pursuant to this **Contract**. On lump sum **Contracts** only, the **City** will also pay the **Contractor** an additional sum as provided in Article 64.2.1(c).

64.2.1(a) For **Work** completed prior to the notice of termination, the **Contractor** shall be paid a pro rata portion of the lump sum bid amount, plus approved change orders, based upon the percent completion of the **Work**, as determined by the **Commissioner**. For the purpose of determining the pro rata portion of the lump sum bid amount to which the **Contractor** is entitled, the bid breakdown submitted in accordance with Article 41 shall be considered, but shall not be dispositive. The **Commissioner's** determination hereunder shall be final, binding, and conclusive.

64.2.1(b) For non-cancelable material and equipment that is not capable of use except in the performance of this **Contract** and has been specifically fabricated for the sole purpose of this **Contract**, but not yet incorporated in the **Work**, the **Contractor** shall be paid the lesser of the following, less salvage value:

64.2.1(b)(i) The Direct Cost, as defined in Article 64.2.4; or

64.2.1(b)(ii) The fair and reasonable value, if less than Direct Cost, of such material and equipment, plus necessary and reasonable delivery costs.

64.2.1(b)(iii) In addition, the **Contractor** shall be paid five (5%) percent of the amount described in Article 64.2.1(b)(i) or Article 64.2.1(b)(ii), whichever applies.

64.2.1(c) Except as otherwise provided in Article 64.2.1(d), on all lump sum **Contracts**, the **Contractor** shall be paid the percentage indicated below applied tothe difference between the total lump sum bid amount and the total of all payments made prior to the notice of termination plus all payments allowed pursuant to Articles 64.2.1(a) and 64.2.1(b):

64.2.1(c)(i) Five (5%) percent of the first five million ($5,000,000) dollars; and

64.2.1(c)(ii) Three (3%) percent of any amount between five million ($5,000,000) dollars and fifteen million ($15,000,000) dollars; plus

64.2.1(c)(iii) One (1%) percent of any amount over fifteen million ($15,000,000) dollars.

64.2.1(d) In the event the **City** terminates a lump sum **Contract** pursuant to this Article 64 within ninety (90) **Days** after registration of the **Contract** with the **Comptroller**, the **Contractor** shall be paid one (1%) percent of the difference between the lump sum bid amount and the total of all payments made pursuant to this Article 64.2.

64.2.2 Unit Price Contracts or Items: On all unit price **Contracts**, or on unit price items ina

Contract, the **City** will pay the **Contractor** the sum of the amounts described in Articles 64.2.2(a) and 64.2.2(b), less all payments previously made pursuant to this **Contract**:

64.2.2(a) For all completed units, the unit price stated in the **Contract**, and

64.2.2(b) For units that have been ordered but are only partially completed, the **Contractor** will be paid:

64.2.2(b)(i) A pro rata portion of the unit price stated in the **Contract** based upon the percent completion of the unit and

64.2.2(b)(ii) For non-cancelable material and equipment, payment willbe made pursuant to Article 64.2.1(b).

64.2.3 Time and Materials Contracts or Items Based on Time and Material Records: On all **Contracts** or items in a **Contract** where payment for the **Work** is based on time and material records, the **Contractor** shall be paid in accordance with Article 26, less all payments previously made pursuant to this **Contract**.

64.2.4 Direct Costs: Direct Costs as used in this Article 64.2 shall mean:

64.2.4(a) The actual purchase price of material and equipment, plus necessary and reasonable delivery costs,

64.2.4(b) The actual cost of labor involved in construction and installation at the **Site**, and

64.2.4(c) The actual cost of necessary bonds and insurance purchased pursuant to requirements of this **Contract** less any amounts that have been or should be refunded by the **Contractor's** sureties or insurance carriers.

64.2.4(d) Direct Costs shall not include overhead.

64.3 In no event shall any payments under this Article 64 exceed the **Contract** price for such items.

64.4 All payments pursuant to Article 64 shall be in the nature of liquidated damages and shall be accepted by the **Contractor** in full satisfaction of all claims against the **City**.

64.5 The **City** may deduct or set off against any sums due and payable pursuant to this Article 64, any deductions authorized by this **Contract** or by **Law** (including but not limited to liquidated damages) and any claims it may have against the **Contractor**. The **City's** exercise of the right to terminate the **Contract** pursuant to this Article 64 shall not impair or otherwise effect the **City's** right to assert any claims it may have against the **Contractor** in a plenary action.

64.6 Where the **Work** covered by the **Contract** has been substantially completed, as determined in writing by the **Commissioner**, termination of the **Work** shall be handled as an omission of **Work** pursuant to Articles 29 and 33, in which case a change order will be issued to reflect an appropriate reduction in the **Contract** sum, or if the amount is determined after final payment, such amount shall be paid by the **Contractor**.

ARTICLE 65. CHOICE OF LAW, CONSENT TO JURISDICTION AND VENUE

65.1 This **Contract** shall be deemed to be executed in the **City** regardless of the domicile of the **Contractor**, and shall be governed by and construed in accordance with the **Laws** of the State of New York and the **Laws** of the United States, where applicable.

65.2 The parties agree that any and all claims asserted against the **City** arising under this **Contract** or related thereto shall be heard and determined in the courts of the State of New York ("New York State Courts") located in the **City** and County of New York. To effect this **Contract** and intent, the **Contractor** agrees:

65.2.1 If the **City** initiates any action against the **Contractor** in Federal court or in a New York State Court, service of process may be made on the **Contractor** either in person, wherever such **Contractor** may be found, or by registered mail addressed to the **Contractor** at its address as set forth in this **Contract**, or to such other address as the **Contractor** may provide to the **City** in writing; and

65.2.2 With respect to any action between the **City** and the **Contractor** in a New York State Court, the **Contractor** hereby expressly waives and relinquishes any rights it might otherwise have:

65.2.2(a) To move to dismiss on grounds of forum non conveniens;

65.2.2(b) To remove to Federal Court; and

65.2.2(c) To move for a change of venue to a New York State Court outside New York County.

65.2.3 With respect to any action brought by the **City** against the **Contractor** in a Federal Court located in the **City**, the **Contractor** expressly waives and relinquishes any right it might otherwise have to move to transfer the action to a Federal Court outside the **City**.

65.2.4 If the **Contractor** commences any action against the **City** in a court located other than in the **City** and County of New York, upon request of the **City**, the **Contractor** shall either consent to a transfer of the action to a New York State Court of competent jurisdiction located in the **City** and County of New York or, if the Court where the action is initially brought will not or cannot transfer the action, the **Contractor** shall consent to dismiss such action without prejudice and may thereafter reinstate the action in a New York State Court of competent jurisdiction in New York County.

65.3 If any provision(s) of this Article 65 is held unenforceable for any reason, each and all other provision(s) shall nevertheless remain in full force and effect.

ARTICLE 66. PARTICIPATION IN AN INTERNATIONAL BOYCOTT

66.1 The **Contractor** agrees that neither the **Contractor** nor any substantially owned affiliated company is participating or shall participate in an international boycott in violation of the provisions ofthe Federal Export Administration Act of 1979, as amended, or the regulations of the United States Department of Commerce (Commerce Department) promulgated thereunder.

66.2 Upon the final determination by the Commerce Department or any other agency of the United States as to, or conviction of the **Contractor** or a substantially-owned affiliated company thereof for participation in an international boycott in violation of the provisions of the Export Administration Act of 1979, as amended, or the regulations promulgated thereunder, the **Comptroller** may, at his/her option, render forfeit and void this **Contract**.

66.3 The **Contractor** shall comply in all respects, with the provisions of Section 6-114 of the Administrative Code and the rules and regulations issued by the **Comptroller** thereunder.

ARTICLE 67. LOCALLY BASED ENTERPRISE PROGRAM

67.1 This **Contract** is subject to the requirements of Section 6-108.1 of the Administrative Code and regulations promulgated thereunder. No construction contract shall be awarded unless and until these requirements have been complied with in their entirety; however, compliance with this Article 67 is not required if the Agency sets Subcontractor Participation Goals for Minority- and Women-Owned Business Enterprises (M/WBEs).

67.2 Unless specifically waived by the **Commissioner** with the approval of the Division of Economic and Financial Opportunity of the **City** Department of Business Services, if any portion of the **Contract** is subcontracted, not less than ten (10%) percent of the total dollar amount of the **Contract** shall be awarded to locally based enterprises (LBEs); except that where less than ten (10%) percent of the total dollar amount of the **Contract** is subcontracted, such lesser percentage shall be so awarded.

67.3 The **Contractor** shall not require performance and payment bonds from LBE **Subcontractors**.

67.4 If the **Contractor** has indicated prior to award that no **Work** will be subcontracted, no **Work** shall be subcontracted without the prior approval of the **Commissioner**, which shall be granted only ifthe **Contractor** makes a good faith effort beginning at least six (6) weeks before the **Work** is to be performed to obtain LBE **Subcontractors** to perform the **Work**.

67.5 If the **Contractor** has not identified sufficient LBE **Subcontractors** prior to award, it shall sign a letter of compliance stating that it complies with Section 6-108.1 of the Administrative Code, recognizes that achieving the LBE requirement is a condition of its **Contract**, and shall submit documentation demonstrating its good faith efforts to obtain LBEs. After award, the **Contractor** shall begin to solicit LBE's to perform subcontracted **Work** at least six (6) weeks before the date such **Work**is to be performed and shall demonstrate that a good faith effort has been made to obtain LBEs on each subcontract until it meets the required percentage.

67.6 Failure of the **Contractor** to comply with the requirements of Section 6-108.1 of the Administrative Code and the regulations promulgated thereunder shall constitute a material breach of this **Contract**. Remedy for such breach may include the imposition of any or all of the following sanctions:

67.6.1 Reducing the **Contractor's** compensation by an amount equal to the dollar value ofthe percentage of the LBE subcontracting requirement not complied with;

67.6.2 Declaring the **Contractor** in default;

67.6.3 If the **Contractor** is an LBE, de-certifying and declaring the **Contractor** ineligibleto participate in the LBE program for a period of up to three (3) years.

ARTICLE 68. ANTITRUST

68.1 The **Contractor** hereby assigns, sells, and transfers to the **City** all right, title, and interest in and to any claims and causes of action arising under the antitrust **Laws** of New York State or of the United States relating to the particular goods or services purchased or procured by the **City** under this **Contract**.

ARTICLE 69. MacBRIDE PRINCIPLES PROVISIONS

69.1 Notice To All Prospective **Contractors**:

69.1.1 Local Law No. 34 of 1991 became effective on September 10, 1991 and added Section 6-115.1 of the Administrative Code. The local **Law** provides for certain restrictions on **City Contracts** to express the opposition of the people of the **City** to employment discrimination practices in Northern Ireland to promote freedom of work-place opportunity.

69.1.2 Pursuant to Section 6-115.1, prospective **Contractors** for **Contracts** to provide goods or services involving an expenditure of an amount greater than ten thousand ($10,000.) dollars, or for construction involving an amount greater than fifteen thousand ($15,000.) dollars, are asked to sign a rider in which they covenant and represent, as a material condition of their **Contract**, that any business operations in Northern Ireland conducted by the **Contractor** and any individual or legal entity in which the **Contractor** holds a ten (10%) percent or greater ownership interest in the **Contractor** will be conducted in accordance with the MacBride Principles of nondiscrimination in employment.

69.1.3 Prospective **Contractors** are not required to agree to these conditions. However, in the case of **Contracts** let by competitive sealed bidding, whenever the lowest responsible bidder has not agreed to stipulate to the conditions set forth in this notice and another bidder who has agreed to stipulate to such conditions has submitted a bid within five (5%) percent of the lowest responsible bid for a **Contract** to supply goods, services or contraction of comparable quality, the **Agency** shall refer such bids to the Mayor, the Speaker or other officials, as appropriate, who may determine, in accordance with applicable **Law**, that it is in the best interest of the **City** that the **Contract** be awarded to other than the lowest responsible pursuant to Section 313(b)(2) of the **City** Charter.

69.1.4 In the case of **Contracts** let by other than competitive sealed bidding, if a prospective **Contractor** does not agree to these conditions, no **Agency**, elected official or the **City** Council shall award the **Contract** to that bidder unless the **Agency** seeking to use the goods, services or construction certifies in writing that the **Contract** is necessary for the **Agency** to perform its functions and there is no other responsible **Contractor** who will supply goods, services or construction of comparable quality at a comparable price.

69.2 In accordance with Section 6-115.1 of the Administrative Code, the **Contractor** stipulates that such **Contractor** and any individual or legal entity in which the **Contractor** holds a ten (10%) percent or greater ownership interest in the **Contractor** either:

69.2.1 Have no business operations in Northern Ireland, or

69.2.2 Shall take lawful steps in good faith to conduct any business operations they have in

Northern Ireland in accordance with the MacBride Principles, and shall permit independent monitoring of their compliance with such principles.

69.3 For purposes of this Article, the following terms shall have the following meanings:

69.3.1 "MacBride Principles" shall mean those principles relating to nondiscrimination in employment and freedom of work-place opportunity which require employers doing business in Northern Ireland to:

69.3.1(a) increase the representation of individuals from under-represented religious groups in the workforce, including managerial, supervisory, administrative, clerical and technical jobs;

69.3.1(b) take steps to promote adequate security for the protection of employees from under-represented religious groups both at the work-place and while traveling toand from **Work**;

69.3.1(c) ban provocative religious or political emblems from the workplace;

69.3.1(d) publicly advertise all job openings and make special recruitment efforts to attract applicants from under-represented religious groups;

69.3.1(e) establish layoff, recall, and termination procedures which do not in practice favor a particular religious group;

69.3.1(f) abolish all job reservations, apprenticeship restrictions and different employment criteria which discriminate on the basis of religion;

69.3.1(g) develop training programs that will prepare substantial numbers of current employees from under-represented religious groups for skilled jobs, including the expansion of existing programs and the creation of new programs to train, upgrade, and improve the skills of workers from under-represented religious groups;

69.3.1(h) establish procedures to asses, identify, and actively recruit employees from under-represented religious groups with potential for further advancement; and

69.3.1(i) appoint a senior management staff member to oversee affirmative actionefforts and develop a timetable to ensure their full implementation.

69.4 The **Contractor** agrees that the covenants and representations in Article 69.2 are material conditions to this **Contract**. In the event the **Agency** receives information that the **Contractor** who made the stipulation required by this Article 69 is in violation thereof, the **Agency** shall review such information and give the **Contractor** an opportunity to respond. If the **Agency** finds that a violation has occurred, the **Agency** shall have the right to declare the **Contractor** in default in default and/or terminate this **Contract** for cause and procure supplies, services or **Work** from another source in the manner the **Agency** deems proper. In the event of such termination, the **Contractor** shall pay to the **Agency**, or the **Agency** in its sole discretion may withhold from any amounts otherwise payable to the **Contractor**, the difference between the **Contract** price for the uncompleted portion of this **Contract** and the cost to the **Agency** of completing performance of this **Contract** either itself or by engaging another **Contractor** or **Contractors**. In the case of a requirement **Contract**, the **Contractor** shall be liable for such difference in price for the entire amount of supplies required by the **Agency** for the uncompleted term of **Contractor's Contract**. In the case of a construction **Contract**, the **Agency** shall also have the right to hold the **Contractor** in partial or total default in

accordance with the default provisions of this **Contract**, and/or may seek debarment or suspension of the **Contractor**. The rights and remedies of the **Agency** hereunder shall be in addition to, and not in lieu of, any rights and remedies the **Agency** has pursuant to this **Contract** or by operation of **Law**.

ARTICLE 70. ELECTRONIC FILING/NYC DEVELOPMENT HUB

70.1 The **Contractor** shall electronically file all alteration type-2 and alteration type-3 applications via the New York City Development Hub Web site, except applications for the following types of minor alterations: enlargements, curb cuts, legalizations, fire alarms, builders pavement plans, and jobs filed on Landmark Preservation Commission calendared properties. All such filings must be professionally certified. Information about electronic filing via the New York City Development Hub is available on the **City** Department of Buildings Web site at www.nyc.gov/buildings.

ARTICLE 71. PROHIBITION OF TROPICAL HARDWOODS

71.1 Tropical hardwoods, as defined in Section 165 of the New York State Finance Law (Finance Law), shall not be utilized in the performance of this **Contract** except as expressly permitted by Section 165 of the Finance Law.

ARTICLE 72. CONFLICTS OF INTEREST

72.1 Section 2604 of the **City** Charter and other related provisions of the **City** Charter, the Administrative Code, and the Penal Law are applicable under the terms of this **Contract** in relation to conflicts of interest and shall be extended to **Subcontractors** authorized to perform **Work**, labor and services pursuant to this **Contract** and further, it shall be the duty and responsibility of the **Contractor**to so inform its respective **Subcontractors**. Notice is hereby given that, under certain circumstances, penalties may be invoked against the donor as well as the recipient of any form of valuable gift.

ARTICLE 73. MERGER CLAUSE

73.1 The written **Contract** herein, contains all the terms and conditions agreed upon by the parties hereto, and no other agreement, oral or otherwise, regarding the subject matter of this **Contract** shall be deemed to exist or to bind any of the parties hereto, or to vary any of the terms contained herein.

ARTICLE 74. STATEMENT OF WORK

74.1 The **Contractor** shall furnish all labor and materials and perform all **Work** in strictaccordance with the **Specifications** and **Addenda** thereto, numbered as shown in Schedule A.

ARTICLE 75. COMPENSATION TO BE PAID TO CONTRACTOR

75.1 The **City** will pay and the **Contractor** will accept in full consideration for the performance of the **Contract**, subject to additions and deductions as provided herein, the total sum shown in Schedule A, this said sum being the amount at which the **Contract** was awarded to the **Contractor** at a public letting thereof, based upon the **Contractor's** bid for the **Contract**.

ARTICLE 76. ELECTRONIC FUNDS TRANSFER

76.1 In accordance with Section 6-107.1 of the Administrative Code, the **Contractor** agrees to accept payments under this **Contract** from the **City** by electronic funds transfer (EFT). An EFT is any transfer of funds, other than a transaction originated by check, draft or similar paper instrument, which is initiated through an electronic terminal, telephonic instrument or computer or magnetic tape so as to order, instruct or authorize a financial institution to debit or credit an account. Prior to the first payment made under this **Contract**, the **Contractor** shall designate one financial institution or other authorized payment agent and shall complete the attached "EFT Vendor Payment Enrollment Form" in order to provide the Commissioner of the **City** Department of Finance with information necessary for the **Contractor** to receive electronic funds transfer payments through a designated financial institution or authorized payment agent. The crediting of the amount of a payment to the appropriate account on the books of a financial institution or other authorized payment agent designated by the **Contractor** shall constitute full satisfaction by the **City** for the amount of the payment under this **Contract**. The account information supplied by the **Contractor** to facilitate the electronic funds transfer shall remain confidential to the fullest extent provided by **Law**.

76.2 The **Commissioner** may waive the application of the requirements of this Article 76 to payments on contracts entered into pursuant to Section 315 of the **City** Charter. In addition, the Commissioner of the Department of Finance and the Comptroller may jointly issue standards pursuant to which the **Agency** may waive the requirements of this Article 76 for payments in the following circumstances: (i) for individuals or classes of individuals for whom compliance imposes a hardship; (ii) for classifications or types of checks; or (iii) in other circumstances as may be necessary in the interest of the **City**.

ARTICLE 77. RECORDS RETENTION

77.1 The **Contractor** agrees to retain all books, records, and other documents relevant to this **Contract** for six years after the final payment or termination of this **Contract**, whichever is later. **City**, state, and federal auditors and any other persons duly authorized by the **City** shall have full access to and the right to examine any such books, records, and other documents during the retention period.

ARTICLE 78. EXAMINATION AND VIEWING OF SITE, CONSIDERATION OF OTHER SOURCES OF INFORMATION AND CHANGED SITE CONDITIONS

78.1 Pre-Bidding (Investigation) Viewing of Site – Bidders must carefully view and examine the **Site** of the proposed **Work**, as well as its adjacent area, and seek other usual sources of information, for they will be conclusively presumed to have full knowledge of any and all conditions and hazards on, about or above the **Site** relating to or affecting in any way the performance of the **Work** to be done under the **Contract** that were or should have been known by a reasonably prudent bidder. To arrange a date for visiting the **Site**,

bidders are to contact the **Agency** contact person specified in the bid documents.

78.2 Should the **Contractor** encounter during the progress of the Work site conditions or environmental hazards at the **Site** materially differing from any shown on the **Contract Drawings** or indicated in the **Specifications** or such conditions or environmental hazards as could not reasonablyhave been anticipated by the **Contractor**, which conditions or hazards will materially affect the cost of the **Work** to be done under the **Contract**, the attention of the **Commissioner** must be called immediately to such conditions or hazards before they are disturbed. The **Commissioner** shall thereupon promptly investigate the conditions or hazards. If the **Commissioner** finds that they do so materially differ, and that they could not have been reasonably anticipated by the **Contractor**, the **Contract** may be modified with the **Commissioner**'s written approval.

ARTICLE 79. PARTICIPATION BY MINORITY-OWNED AND WOMEN-OWNED BUSINESS ENTERPRISES IN CITY PROCUREMENT

ARTICLE I. M/WBE PROGRAM

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

If this Contract is subject to the M/WBE Program established by Section 6-129, the specific requirements of MBE and/or WBE participation for this Contract are set forth in Schedule B of the Contract (entitled the "M/WBE Utilization Plan") and are detailed below.

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

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

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

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

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

PART A: PARTICIPATION GOALS FOR CONSTRUCTION, STANDARD AND PROFESSIONAL SERVICES CONTRACTS OR TASK ORDERS

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

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

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

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

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

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

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

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

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

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

6. MBE and WBE firms must be certified by DSBS in order for the Contractor to credit such firms' participation toward the attainment of the Participation Goals. Such certification must occur prior to the firms' commencement of work. A list of city-certified MBE and WBE firms may be obtained from the DSBS website at www.nyc.gov/buycertified, by emailing DSBS at buyer@sbs.nyc.gov, by calling (212) 513-6451, or by visiting or writing DSBS at One Liberty Plaza ., New York, New York, 10006, 11th floor. Eligible firms that have not yet

been certified may contact DSBS in order to seek certification by visiting www.nyc.gov/getcertified, emailing MWBE@sbs.nyc.gov, or calling the DSBS certification helpline at (212) 513-6311. A firm that is certified as both an MBE and a WBE may be counted either toward the goal for MBEs or the goal for WBEs, but not both. No credit shall be given for participation by a graduate MBE or graduate WBE, as defined in Section 6-129(c)(20).

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

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

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

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

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

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

(d) Agency may grant a full or partial waiver of the Participation Goals to a bidder, proposer or contractor, as applicable, who demonstrates—before submission of the bid, proposal or Task Order, as applicable—that it has legitimate business reasons for proposing the level of subcontracting in its M/WBE Utilization Plan. In making its determination, Agency shall consider factors that shall include, but not be limited

to, whether the bidder, proposer or contractor, as applicable, has the capacity and the bona fide intention to perform the Contract without any subcontracting, or to perform the Contract without awarding the amount of subcontracts represented by the Participation Goals. In making such determination, Agency may consider whether the M/WBE Utilization Plan is consistent with past subcontracting practices of the bidder, proposer or contractor, as applicable, whether the bidder, proposer or contractor, as applicable, has made efforts to form a joint venture with a certified firm, and whether the bidder, proposer, or contractor, as applicable, has made good faith efforts to identify other portions of the Contract that it intends to subcontract.

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

(i) The Contractor advertised opportunities to participate in the Contract, where appropriate, in general circulation media, trade and professional association publications and small business media, and publications of minority and women's business organizations;
(ii) The Contractor provided notice of specific opportunities to participate in the Contract, in a timely manner, to minority and women's business organizations;
(iii) The Contractor sent written notices, by certified mail or facsimile, in a timely manner, to advise MBEs or WBEs that their interest in the Contract was solicited;
(iv) The Contractor made efforts to identify portions of the work that could be substituted for portions originally designated for participation by MBEs and/or WBEs in the M/WBE Utilization Plan, and for which the Contractor claims an inability to retain MBEs or WBEs;
(v) The Contractor held meetings with MBEs and/or WBEs prior to the date their bids or proposals were due, for the purpose of explaining in detail the scope and requirements of the work for which their bids or proposals were solicited;
(vi) The Contractor made efforts to negotiate with MBEs and/or WBEs as relevant to perform specific subcontracts, or act as suppliers or service providers;
(vii) Timely written requests for assistance made by the Contractor to Agency's M/WBE liaison officer and to DSBS;
(viii) Description of how recommendations made by DSBS and Agency were acted upon and an explanation of why action upon such recommendations did not lead to the desired level of participation of MBEs and/or WBEs.

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

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

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

efforts listed in Section 11(a) above, as applicable, along with any other relevant factors.

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

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

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

PART B: MISCELLANEOUS

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

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

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

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

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

ARTICLE II. ENFORCEMENT

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

2. Whenever Agency believes that the Contractor or a subcontractor is not in compliance with Section 6-129

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

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

(a) entering into an agreement with the Contractor allowing the Contractor to cure the violation;
(b) revoking the Contractor's pre-qualification to bid or make proposals for future contracts;
(c) making a finding that the Contractor is in default of the Contract;
(d) terminating the Contract;
(e) declaring the Contractor to be in breach of Contract;
(f) withholding payment or reimbursement;
(g) determining not to renew the Contract;
(h) assessing actual and consequential damages;
(i) assessing liquidated damages or reducing fees, provided that liquidated damages may be based on amounts representing costs of delays in carrying out the purposes of the M/WBE Program, or in meeting the purposes of the Contract, the costs of meeting utilization goals through additional procurements, the administrative costs of investigation and enforcement, or other factors set forth in the Contract;
(j) exercising rights under the Contract to procure goods, services or construction from another contractor and charge the cost of such contract to the Contractor that has been found to be in noncompliance; or
(k) taking any other appropriate remedy.

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

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

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

7. The Contractor's record in implementing its M/WBE Utilization Plan shall be a factor in the evaluation of

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

Docusign Envelope ID: 5A456EFA-A910-8603-821E-CAC6D4B603EA

CONTRACT SIGNATURE PAGE

This Contract is entered by and between the City of New York ("City"), acting by and through the **DEPARTMENT OF DESIGN AND CONSTRUCTION**, and **ANDRON CONSTRUCTION CORP** ("Contractor").

This Contract consists of this contract signature page as well as the following documents ("Contract Documents") which are located in the Documents tab of the PASSPort record titled **85026B0010-P-1TREREC** .

1. _Broker Certification(1) - Apr 22 2026 4:02PM
2. _C-105.2 City of New York - Apr 22 2026 4:03PM
3. _City of New York-REV - Apr 22 2026 4:03PM
4. _DB-120.1 City of New York 1.31.2027p - Apr 22 2026 4:03PM
5. _Payment and Performance Bonds - Apr 22 2026 4:03PM
6. 2_Subcontractor ID Form - Apr 16 2026 1:28PM
7. 4_Bid Bond Executed - Apr 16 2026 1:31PM
8. NYSDOL Registration Certificate(2) - Apr 16 2026 1:34PM
9. P-1TREREC Andron bid schedule - Apr 22 2026 3:56PM
10. P-1TREREC_Addendum1 - Jan 7 2026 5:26PM
11. P-1TREREC_Addendum2 - Jan 22 2026 3:09PM
12. P-1TREREC_Addendum3 - Feb 2 2026 5:08PM
13. P-1TREREC_Addendum4 - Feb 6 2026 1:03PM
14. P-1TREREC_Appendix_1A_Addendum4 - Feb 5 2026 6:28PM
15. P-1TREREC_Appendix_1B_Addendum4 - Feb 5 2026 6:23PM
16. P-1TREREC_Appendix_2-7 - Aug 15 2025 1:26PM
17. P-1TREREC_Bid Drawings_Addendum3 - Feb 2 2026 3:35PM
18. P-1TREREC_Postponement Notice_2025-0128 - Dec 11 2025 1:42PM
19. P-1TREREC_Postponement Notice_2026-0212 - Apr 16 2026 1:35PM
20. P-1TREREC_Proprietary Items List - Aug 15 2025 1:24PM
21. P-1TREREC_Special Experience Requirements - Apr 27 2026 5:05PM
22. P-1TREREC_Volume2_Addendum3 - Feb 2 2026 3:37PM
23. P-1TREREC_Volume3_Addendum3 - Feb 2 2026 5:08PM
24. Proposal_Bid_85026B0010001.pdf - Apr 8 2026 7:29PM
25. Qualification Form and Apprenticeship Letter - Apr 16 2026 1:39PM
26. RFx Document_85026B0010001 (1).pdf - Apr 8 2026 7:29PM
27. Section3.4BidBreakdownTemplateR11..... - Oct 30 2024 2:54PM
28. Subcontractor ID Form..... - Oct 30 2024 8:55PM

The above order does not represent an order of precedence. The Contract shall be governed by the order of precedence, if any, in the Contract Documents or by ordinary contract principles if no such order of precedence exists.

Each party is signing this Contract electronically on the date stated in that party's electronic signature.

The City of New York
By: **DEPARTMENT OF DESIGN AND CONSTRUCTION**

DocuSigned by:
ERIC MACFARLANE
1A87ABA0188B41C...

Docusign Envelope ID: 5A456EFA-A910-8603-821E-CAC6D4B603EA

(Signature)

Name: ERIC MACFARLANE

Title: First Deputy Commissioner

Date: 5/5/2026 | 13:30:02 EDT

Contractor
By: **ANDRON CONSTRUCTION CORP**

Signed by:

518416E0854B490...

(Signature)

Name: Matthew Winter

Title: Senior V.P.

Date: 5/5/2026 | 13:06:38 EDT

Bond No. 015231614

PERFORMANCE BOND #2

Performance Bond #2 (4 pages): Use if the total contract price is more than $5 Million.

PERFORMANCE BOND #2 (Page 1)

PERFORMANCE BOND #2KNOW ALL PERSONS BY THESE PRESENTS:,

That we, Andron Construction Corp., 21 Anderson Lane, Goldens Bridge, NY 10526

hereinafter referred to as the "Principal,"
and, Liberty Mutual Insurance Company, 175 Berkeley Street, Boston, MA 02116

hereinafter referred to as the "Surety" ("Sureties") are held and firmly bound to THE CITY OF NEW YORK, hereinafter referred to as the "City" or to its successors and assigns in the penal sum of Sixty Three Million Four Hundred Eighty Five Thousand and 02/100 Dollars

($ 63,485,000.02) Dollars, lawful money of the United States for the payment of which said sum of money well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal is about to enter, or has entered, into a Contract in writing with the City for

FMS #: P-1TREREC, Walter Gladwin Recreation Center, 550 East Tremont Avenue, Bronx, NY 10457,

Contract No. 1 - General Construction Work.

a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth infull;

NOW, THEREFORE, the conditions of this obligation are such that if the Principal, his or its representatives or assigns, shall well and faithfully perform the said Contract and all modifications, amendments, additions and alterations thereto that may hereafter be made, according to its terms and its true intent and meaning, including repair and or replacement of defective work and guarantees of maintenance for the periods stated in the Contract, and shall fully indemnify and save harmless the Cityfrom all cost and damage which it may suffer by reason of the Principal's default of the Contract, and shall fully reimburse and repay the City for all outlay and expense which the City may incur in making

good any such default and shall protect the said City of New York against, and pay any and all amounts,damages, cost and judgments which may or shall be recovered against said City or its officers or agents orwhich the said City of New York may be called upon to pay any person or corporation by reason of anydamages arising or growing out of the Principal's default of the Contract, then this obligation shall be nulland void, otherwise to remain in full force and effect.

The Surety (Sureties), for value received, hereby stipulates and agrees, upon written notice from the Citythat the City has determined that the Principal is in default of the Contract, to either (1) pay the full amount of the above penal sum in complete discharge and exoneration of this bond and of all the liabilities of the Surety relating to this bond, or (2) fully perform and complete the Work to be performed under theContract, pursuant to the terms, conditions, and covenants thereof. The Surety (Sureties) further agrees, at its option, either to tender the penal sum or to commence and diligently perform the Work specified in the Contract, including physical site work, within twenty-five (25) business days after written notice thereoffrom the City and to complete all Work within the time set forth in the Contract or such other time as agreed to between the City and Surety in accordance with the Contract. The Surety and the City reserve all rights and defenses each may have against the other; provided, however, that the Surety expressly agrees that its reservation of rights shall not provide a basis for non-performance of its obligation to commence and to complete all Work as provided herein.

The Surety (Sureties), for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of said Surety (Sureties) and its bond shall be in no way impaired or affected byany extension of time, modification, omission, addition, or change in or to the said Contract or the Work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of any Work to be performed or any moneys due or to become due thereunder; and said Surety (Sureties) does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to assignees, subcontractors, and other transferees shall have the same effect as to said Surety (Sureties) as though done or omitted to be done by or in relation to said Principal.

IN WITNESS WHEREOF, The Principal and the Surety (Sureties) have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereunto affixed and these presents to be signed by their proper officers, this

1st day of April 2026.

(Seal)

Andron Construction Corp. (L.S.)
Principal

(Seal)

By: [signature]
MATTHEW WINTER, SENIOR V.P.
Surety

Liberty Mutual Insurance Company
By: [signature]
Desiree Cardlin, Attorney-In-Fact
Surety

(Seal)

By: _____
Surety

(Seal)

By: _____
Surety

(Seal)

By: _____
Surety

(Seal)

By: _____

Bond Premium Rate Scheduled Rate

Bond Premium Cost $447,586.00

If the Contractor (Principal) is a partnership, the bond should be signed by each of the individuals who are partners.

If the Contractor (Principal) is a corporation, the bond should be signed in its correct corporate name by aduly authorized officer, agent, or attorney-in-fact.

There should be executed an appropriate number of counterparts of the bond corresponding to the numberof counterparts of the Contract.

ACKNOWLEDGMENT OF PRINCIPAL IF A CORPORATION

State of New York County of WESTCHESTER ss:

On this 15th day of APRIL, 20 26 before me personally came MATTHEW WINTER,
to me known, who, being by me duly sworn did depose and say that he residesat 21 ANDERSON LANE GOLDENS BRIDGE, NY 10526 ; that he/she is the SENIOR VICE PRESIDENT of the corporation described in and which executed the foregoing instrument; that he/she signed his/her name to theforegoing instrument by order of the directors of said corporation as the duly authorized and binding act thereof.

Joel F Foley

Notary Public or Commissioner of Deeds.

JOEL F. FOLEY
STATE OF NEW YORK
NOTARY PUBLIC
Qualified in Dutchess County
01F06413634
MY COMMISSION EXPIRES 02/01/2029

ACKNOWLEDGMENT OF PRINCIPAL IF A PARTNERSHIP

State of_____County of_____ss:

On this_____day of_____, 20_____before me personally came_____,
to me known, who, being by me duly sworn did depose and say that he/she residesat_____
_____; that he/she is_____partner of _____, a limited/general partnership existing under the laws of the State of _____, the partnership described in and which executed the foregoing instrument;and that he/she signed his/her name to the foregoing instrument as the duly authorized and binding act of said partnership.

_____

Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT OF PRINCIPAL IF AN INDIVIDUAL

State of_____County of_____ss:

On this_____day of_____, 20_____before me personally came_____,
to me known, who, being by me duly sworn did depose and say that he/she residesat_____
_____, and that he/she is the individual whose name is subscribed to the within instrument and acknowledged to me that by his/her signature on the instrument, said individual executed the instrument.

_____

Notary Public or Commissioner of Deeds

Each executed bond should be accompanied by: (a) appropriate acknowledgments of the respective parties; (b) appropriate duly certified copy of Power of Attorney or other certificate of authority where bond is executed by agent, officer or other representative of Principal or Surety; (c) a duly certified extract from By-Laws or resolutions of Surety under which Power of Attorney or other certificate of authority of its agent, officer or representative was issued, and (d) certified copy of latest published financial statement of assets and liabilities of Surety.

* * * * * * * *

Affix Acknowledgments and Justification of Sureties.

POWER OF ATTORNEY

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

Certificate No: **8215486 - 969603**

KNOWN ALL PERSONS BY THESE PRESENTS: That The Ohio Casualty Insurance Company is a corporation duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Camille Maitland, Colette R. Chisholm, Cristina Pagan, Dana Granice, Desiree Cardin, Fiona Walsh, George O. Brewster, George S. Macholz, Karolynne Ramirez, Katherine Acosta, Lee Ferrucci, Louis J. Spina, Michelle Wannamaker, Miranda Peter, Nelly Renchiwich, Peter F. Jones, Robert T. Pearson, Susan Lupski, Thomas Bean, Vincent A. Walsh, Vishnu Chaitoo

all of the city of Uniondale state of NY each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 26th day of January, 2026.

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

By: _____
Nathan J. Zangerle, Assistant Secretary

State of PENNSYLVANIA
County of MONTGOMERY ss

On this 26th day of January, 2026 before me personally appeared Nathan J. Zangerle, who acknowledged himself to be the Assistant Secretary of Liberty Mutual Insurance Company, The Ohio Casualty Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.

Commonwealth of Pennsylvania - Notary Seal
Teresa Pastella, Notary Public
Montgomery County
My commission expires March 28, 2029
Commission number 1126044
Member, Pennsylvania Association of Notaries

By: _____
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

ARTICLE IV – OFFICERS: Section 12. Power of Attorney.
Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and execution of any such instruments and to attach thereto the seal of the Corporation. When so executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

ARTICLE XIII – Execution of Contracts: Section 5. Surety Bonds and Undertakings.
Any officer of the Company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Company by their signature and execution of any such instruments and to attach thereto the seal of the Company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

Certificate of Designation – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes Nathan J. Zangerle, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 1st day of April, 2026.

By: _____
Renee C. Llewellyn, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

For bond and/or Power of Attorney (POA) verification inquiries, please call 610-832-8240 or email HOSUR@libertymutual.com.

ACKNOWLEDGEMENT OF SURETY COMPANY

STATE OF NEW YORK

COUNTY OF NASSAU

On this April 1, 2026, before me personally came Desiree Cardlin to me known, who, being by me duly sworn, did depose and say; that he/she resides in Suffolk County, State of New York that he/she is the Attorney-In-Fact of the Liberty Mutual Insurance Company

the corporation described in which executed the above instrument; that he/she knows the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that is was so affixed by the Board of Directors of said corporation; and that he/she signed his/her name thereto by like order; and the affiant did further depose and say that the Superintendent of Insurance of the State of New York, has, pursuant to Section 1111 of the Insurance Law of the State of New York, issued to Liberty Mutual Insurance Company (Surety) his/her certificate of qualification evidencing the qualification of said Company and its sufficiency under any law of the State of New York as surety and guarantor, and the propriety of accepting and approving it as such; and that such Certificate has not been revoked.

TARA LAVERDIERE
Notary Public, State of New York
Registration #01LA6076587
Qualified in Nassau County
Commission Expires June 24, 2026

Notary Public

LIBERTY MUTUAL INSURANCE COMPANY

FINANCIAL STATEMENT – DECEMBER 31, 2024

Assets	
Cash and Bank Deposits	$4,608,826,756.00
*Bonds – U.S Government	$4,281,375,446.74
*Other Bonds	$21,566,489,527.26
*Stocks	$15,589,644,012.00
Real Estate	$86,497,925.00
Agents' Balances or Uncollected Premiums	$7,512,975,129.00
Accrued Interest and Rents	$225,249,712.00
Other Admitted Assets	$19,367,663,200.00
Total Admitted Assets	**$74,539,483,661.00**

Liabilities	
Unearned Premiums	$9,890,896,878.00
Reserve for Claims and Claims Expense	$29,467,071,865.00
Funds Held Under Reinsurance Treaties	$341,948,172.00
Reserve for Dividends to Policyholders	$954,025.00
Additional Statutory Reserve	$150,547,865.00
Reserve for Commissions, Taxes and Other Liabilities	$5,049,906,410.00
Total	**$47,104,416,171.00**
Special Surplus Funds	$174,153,086.00
Capital Stock	$10,000,075.00
Paid in Surplus	$13,209,595,772.00
Unassigned Surplus	$13,415,980,561.00
Surplus to Policyholders	$27,435,067,490.00
Total Liabilities and Surplus	**$74,539,483,661.00**

* Bonds are stated at amortized or investment value; Stocks at Association Market Values.
The foregoing financial information is taken from Liberty Mutual Insurance Company's financial statement filed with the Massachusetts Department of Insurance.

I, TIM MIKOLAJEWSKI, Assistant Secretary of Liberty Mutual Insurance Company, do hereby certify that the foregoing is a true, and correct statement of the Assets and Liabilities of said Corporation, as of December 31, 2024, to the best of my knowledge and belief.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Corporation at Seattle, Washington, this 8th day of March, 2025.

LIBERTY MUTUAL INSURANCE COMPANY INCORPORATED 1912 MASSACHUSETTS

Timothy A. Mikolajewski, Assistant Secretary

LMS-1262/LMIC

Bond No. 015231614

PAYMENT BOND

Use for any contract for which a Payment Bond is required.

PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS, That we, Andron Construction Corp.,

21 Anderson Lane, Goldens Bridge, NY 10526

hereinafter referred to as the "Principal", and Liberty Mutual Insurance Company,

175 Berkeley Street, Boston, MA 02116

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

Sixty Three Million Four Hundred Eighty Five Thousand and 02/100 Dollars

($63,485,000.02) Dollars, lawful money of the United States, for the payment of which said sum of money well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal is about to enter, or has entered, into a Contract in writing with the City for

FMS #: P-1TREREC, Walter Gladwin Recreation Center, 550 East Tremont Avenue, Bronx, NY 10457,

Contract No. 1 - General Construction Work.

a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth in full;

NOW, THEREFORE, the conditions of this obligation are such that if the Principal, his or its representatives or assigns and other Subcontractors to whom Work under this Contract is sublet and his or their successors and assigns shall promptly pay or cause to be paid all lawful claims for

(a) Wages and compensation for labor performed and services rendered by all persons engaged in the prosecution of the Work under said Contract, and any amendment or extension thereof or addition thereto, whether such persons be agents servants or employees of the Principal or any such Subcontractor, including all persons so engaged who perform the work of laborers or mechanics at or in the vicinity of the site of the Project regardless of any contractual relationship between the Principal or such Subcontractors, or his or their successors or assigns, on the one hand and such laborers or mechanics on the other, but not including office employees not regularly stationed at the site of the project; and

(b) Materials and supplies (whether incorporated in the permanent structure or not), as well as teams, fuels, oils, implements or machinery furnished, used or consumed by said Principal or any subcontractor at or in the vicinity of the site of the Project in the prosecution of the Work under said Contract and any amendment or extension thereof or addition thereto; then this obligation shall be void, otherwise to remain infull force and effect.

This bond is subject to the following additional conditions, limitations and agreements:

(a) The Principal and Surety (Sureties) agree that this bond shall be for the benefit of any materialmen or laborer having a just claim, as well as the City itself.

(b) All persons who have performed labor, rendered services or furnished materials and supplies,as aforesaid, shall have a direct right of action against the Principal and his, its or their successors and assigns, and the Surety (Sureties) herein, or against either or both or any of them and their successors and assigns. Such persons may sue in their own name, and may prosecute the suit to judgment and execution without the necessity of joining with any other persons as party plaintiff.

(c) The Principal and Surety (Sureties) agree that neither of them will hold the City liable for any judgment for costs of otherwise, obtained by either or both of them against a laborer or materialman in a suit brought by either a laborer or materialman under this bond for moneys allegedly due for performing work or furnishing material.

(d) The Surety (Sureties) or its successors and assigns shall not be liable for any compensation recoverable by an employee or laborer under the Workmen's Compensation Law.

(e) In no event shall the Surety (Sureties), or its successors or assigns, be liable for a greater sum than the penalty of this bond or be subject to any suit, action or proceeding hereon that is instituted by any person, firm, or corporation hereunder later than two years after the complete performance of said Contract and final settlement thereof.

The Principal, for himself and his successors and assigns, and the Surety (Sureties), for itself and its successors and assigns, do hereby expressly waive any objection that might be interposed as to the rightof the City to require a bond containing the foregoing provisions, and they do hereby further expressly waiveany defense which they or either of them might interpose to an action brought hereon by any person, firm or corporation, including subcontractors, materialmen and third persons, for work, labor, services, supplies or material performed rendered, or furnished as aforesaid upon the ground that there is no law authorizing the City to require the foregoing provisions to be place in this bond.

And the Surety (Sureties), for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of said Surety (Sureties), and its bonds shall be in no way impaired or affected by any extension of time, modification, omission, addition, or change in or of the said Contract or the work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of any part thereof, or of any Work to be performed, or any moneys due to become due thereunder and said Surety (Sureties) does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to assignees, Subcontractors, and other transferees shall have the same effect as to said Surety (Sureties) as though done or omitted to be done or in relation to said Principal.

PAYMENT BOND (Page 3)

IN WITNESS WHEREOF, the Principal and the Surety (Sureties) have hereunto set their handsand seals, and such of them as are corporations have caused their corporate seals to be hereunto affixed andthese presents to be signed by their proper officers, this 1st day of April, 2026.

(Seal) Andron Construction Corp. (L.S.)Principal

By: [signature]
MATTHEW WINTON, SENIOR V.P.

(Seal) Liberty Mutual Insurance Company Surety

By: Desiree Cardlin
Desiree Cardlin, Attorney-In-Fact

(Seal) _____ Surety

By: _____

(Seal) _____ Surety

By: _____

(Seal) _____ Surety

By: _____

If the Contractor (Principal) is a partnership, the bond should be signed by each of the individuals who are partners.

If the Contractor (Principal) is a corporation, the bond should be signed in its correct corporate name by aduly authorized officer, agent, or attorney-in-fact.

There should be executed an appropriate number of counterparts of the bond corresponding to the numberof counterparts of the Contract.

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION

State of New York County of Westchester ss:

On this 15th day of April, 2026, before me personally came Matthew Winter to me known, who, being by me duly sworn did depose and say that he resides at 21 Anderson Lane, Goldens Bridge, NY 10526 that he is the Senior Vice President of the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that one of the seals affixed to said instrument is such seal; that it was so affixed by order of the directors of said corporation, and that he signed his name thereto by like order.

Joel F. Foley

Notary Public or Commissioner of Deeds

JOEL F. FOLEY
STATE OF NEW YORK
NOTARY PUBLIC
Qualified In Dutchess County
01F06413634
MY COMMISSION EXPIRES 02/01/2029

ACKNOWLEDGMENT OF PRINCIPAL, IF A PARTNERSHIP

State of_____County of_____ss:

On this_____day of_____,_____, before me personally appeared _____ to me known, and known to me to be one of the members of the firm of _____ _____ described in and who executed the foregoing instrument; and he acknowledged to me that he executed the same as and for the act and deed of said firm.

_____

Notary Public or Commissioner of Deeds

ACKNOWLEDGMENT OF PRINCIPAL, IF AN INDIVIDUAL

State of_____County of_____ss:

On this _____ day of_____,_____, before me personally appeared _____ to me known, and known to me to be the person described in and who executed the foregoing instrument; and acknowledged that he executed the same.

_____

Notary Public or Commissioner of Deeds

Each executed bond should be accompanied by: (a) appropriate acknowledgments of the respective parties; (b) appropriate duly certified copy of Power of Attorney or other certificate of authority where bondis executed by agent, officer or other representative of Principal or Surety; (c) a duly certified extract from By-Laws or resolutions of Surety under which Power of Attorney or other certificate of authority of its agent, officer or representative was issued, and (d) certified copy of latest published financial statement of assets and liabilities of Surety.

* * * * * * * *

Affix Acknowledgments and Justification of Sureties.

POWER OF ATTORNEY

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

Certificate No: **8215486 - 969603**

KNOWN ALL PERSONS BY THESE PRESENTS: That The Ohio Casualty Insurance Company is a corporation duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Camille Maitland, Colette R. Chisholm, Cristina Pagan, Dana Granice, Desiree Cardin, Fiona Walsh, George O. Brewster, George S. Macholz, Karolynne Ramirez, Katherine Acosta, Lee Ferrucci, Louis J. Spina, Michelle Wannamaker, Miranda Peter, Nelly Renchiwich, Peter F. Jones, Robert T. Pearson, Susan Lupski, Thomas Bean, Vincent A. Walsh, Vishnu Chaitoo

all of the city of Uniondale state of NY each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 26th day of January, 2026.

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

By: _____
Nathan J. Zangerle, Assistant Secretary

State of PENNSYLVANIA
County of MONTGOMERY ss

On this 26th day of January, 2026 before me personally appeared Nathan J. Zangerle, who acknowledged himself to be the Assistant Secretary of Liberty Mutual Insurance Company, The Ohio Casualty Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.

Commonwealth of Pennsylvania - Notary Seal
Teresa Pastella, Notary Public
Montgomery County
My commission expires March 28, 2029
Commission number 1126044
Member, Pennsylvania Association of Notaries

By: _____
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

ARTICLE IV – OFFICERS: Section 12. Power of Attorney.
Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and execution of any such instruments and to attach thereto the seal of the Corporation. When so executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

ARTICLE XIII – Execution of Contracts: Section 5. Surety Bonds and Undertakings.
Any officer of the Company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Company by their signature and execution of any such instruments and to attach thereto the seal of the Company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

Certificate of Designation – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes Nathan J. Zangerle, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 1st day of April, 2026.

By: _____
Renee C. Llewellyn, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

For bond and/or Power of Attorney (POA) verification inquiries, please call 610-832-8240 or email HOSUR@libertymutual.com.

ACKNOWLEDGEMENT OF SURETY COMPANY

STATE OF NEW YORK

COUNTY OF NASSAU

On this April 1, 2026, before me personally came Desiree Cardlin to me known, who, being by me duly sworn, did depose and say; that he/she resides in Suffolk County, State of New York that he/she is the Attorney-In-Fact of the Liberty Mutual Insurance Company

the corporation described in which executed the above instrument; that he/she knows the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that is was so affixed by the Board of Directors of said corporation; and that he/she signed his/her name thereto by like order; and the affiant did further depose and say that the Superintendent of Insurance of the State of New York, has, pursuant to Section 1111 of the Insurance Law of the State of New York, issued to Liberty Mutual Insurance Company (Surety) his/her certificate of qualification evidencing the qualification of said Company and its sufficiency under any law of the State of New York as surety and guarantor, and the propriety of accepting and approving it as such; and that such Certificate has not been revoked.

Notary Public

TARA LAVERDIERE
Notary Public, State of New York
Registration #01LA6076587
Qualified in Nassau County
Commission Expires June 24, 2026

LIBERTY MUTUAL INSURANCE COMPANY

FINANCIAL STATEMENT – DECEMBER 31, 2024

Assets	
Cash and Bank Deposits	$4,608,826,756.00
*Bonds – U.S Government	$4,281,375,446.74
*Other Bonds	$21,566,489,527.26
*Stocks	$15,589,644,012.00
Real Estate	$86,497,925.00
Agents' Balances or Uncollected Premiums	$7,512,975,129.00
Accrued Interest and Rents	$225,249,712.00
Other Admitted Assets	$19,367,663,200.00
Total Admitted Assets	**$74,539,483,661.00**

Liabilities	
Unearned Premiums	$9,890,896,878.00
Reserve for Claims and Claims Expense	$29,467,071,865.00
Funds Held Under Reinsurance Treaties	$341,948,172.00
Reserve for Dividends to Policyholders	$954,025.00
Additional Statutory Reserve	$150,547,865.00
Reserve for Commissions, Taxes and Other Liabilities	$5,049,906,410.00
Total	**$47,104,416,171.00**
Special Surplus Funds	$174,153,086.00
Capital Stock	$10,000,075.00
Paid in Surplus	$13,209,595,772.00
Unassigned Surplus	$13,415,980,561.00
Surplus to Policyholders	$27,435,067,490.00
Total Liabilities and Surplus	**$74,539,483,661.00**

* Bonds are stated at amortized or investment value; Stocks at Association Market Values.
The foregoing financial information is taken from Liberty Mutual Insurance Company's financial statement filed with the Massachusetts Department of Insurance.

I, TIM MIKOLAJEWSKI, Assistant Secretary of Liberty Mutual Insurance Company, do hereby certify that the foregoing is a true, and correct statement of the Assets and Liabilities of said Corporation, as of December 31, 2024, to the best of my knowledge and belief.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Corporation at Seattle, Washington, this 8th day of March, 2025.

LIBERTY MUTUAL INSURANCE COMPANY INCORPORATED 1912 MASSACHUSETTS

Timothy A. Mikolajewski, Assistant Secretary

LMS-1262/LMIC

Client#: 1690239 ANDROCON1

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 4/16/2026

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer any rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
USI Insurance Services, LLC
726 Exchange St. Ste 618
Buffalo, NY 14210
(855) 874-0123

CONTACT NAME: Michael Scarcello
PHONE (A/C, No, Ext): FAX (A/C, No):
E-MAIL ADDRESS: Michael.Scarcello@usi.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Zurich American Insurance Company	16535
INSURER B : Starr Indemnity and Liability Company	38318
INSURER C : Vantage Risk Assurance Company	32077
INSURER D : Argonaut Insurance Company	19801
INSURER E : Navigators Insurance Company	42307
INSURER F : The Travelers Indemnity Company	25658

INSURED
Andron Construction Corporation
21 Anderson Lane
Goldens Bridge, NY 10526

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY	X	X	GLO0380759	07/01/2025	07/01/2026	EACH OCCURRENCE	$2,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$1,000,000
	X Contractual Liab						MED EXP (Any one person)	$10,000
							PERSONAL & ADV INJURY	$2,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$4,000,000
	POLICY X PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$4,000,000
	OTHER:							$
A	AUTOMOBILE LIABILITY	X	X	BAP0380760	07/01/2025	07/01/2026	COMBINED SINGLE LIMIT (Ea accident)	$2,000,000
	ANY AUTO						BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	X HIRED AUTOS ONLY / X NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
	X $250 Comp Ded X $500 Coll Ded							$
B	X UMBRELLA LIAB X OCCUR	X	X	1000588485251	07/01/2025	07/01/2026	EACH OCCURRENCE	$15,000,000
C	X EXCESS LIAB CLAIMS-MADE	X	X	P04XC0000061671	07/01/2025	07/01/2026	AGGREGATE	$15,000,000
D	DED RETENTION $	X	X	AR6462228	07/01/2025	07/01/2026		$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY		X	WC0380758	07/01/2025	07/01/2026	X PER STATUTE OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y / N: N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A					E.L. EACH ACCIDENT	$1,000,000
							E.L. DISEASE - EA EMPLOYEE	$1,000,000
							E.L. DISEASE - POLICY LIMIT	$1,000,000
E	Excess Liability	X	X	NY25EXCZ08SKKIV	07/01/2025	07/01/2026	10,000,000 Each Occ/Agg	
F	Excess Liability	X	X	EX2S72387725NF	07/01/2025	07/01/2026	$4,000,000 Each Occ/Agg	
G	Pollution/Profess			03108614	07/01/2025	07/01/2026	$5,000,000 Each Occ/Agg	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Insurer G Affording Coverage - Allied World Assurance Co., Inc. US - NAIC # 10690
To the extent covered by endorsement form(s):
General Liability:
U-GL-2162-A CW (02/19) Additional Insured - Automatic - Owners, Lessees Or Contractors
U-GL-1345-C CW (03/20) General Liability Supplemental Coverage Endorsement - Blanket Additional Insured
(See Attached Descriptions)

CERTIFICATE HOLDER

City of New York
c/o NYC Department of Design and Construction
30-30 Thomson Avenue
Long Island City, NY 11101

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

© 1988-2015 ACORD CORPORATION. All rights reserved.

DESCRIPTIONS (Continued from Page 1)

Vendors, Waiver of Right of Subrogation
U-GL-1521-B CW (01/19) Blanket Notification to Others of Cancellation or Non-Renewal
Automobile Liability:
U-CA-424-H NY (10/21) Coverage Extension Endorsement - Blanket Additional Insured, Waiver of Right of Subrogation
U-CA-832-B CW (03/23) Blanket Notification to Others of Cancellation or Non-Renewal
Workers' Compensation:
WC 00 03 13 (04/84) Blanket Waiver of Our Right to Recover from Others Endorsement
WC 99 06 43 (01/13) Blanket Notification to Others of Cancellation or Non-Renewal

RE: Contract No.: P-1TREREC.
Walter Gladwin Recreation Center Borough of the Bronx.
City of New York, including its officials and employees, is included as Additional Insured as required by contract.

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART III. Certification by Insurance Broker or Agent

The undersigned insurance broker or agent represents to the City of New York that the attached Certificate of Insurance is accurate in all material respects.

USI Insurance Services
[Name of broker or agent (typewritten)]

726 Exchange St., Suite 618, Buffalo, NY 14210
[Address of broker or agent (typewritten)]

michael.scarcello@usi.com
[Email address of broker or agent (typewritten)]

(716) 314-2082
[Phone number/Fax number of broker or agent (typewritten)]

Michael Scarcello
[Signature of authorized official or broker or agent]

Michael Scarcello - Account Manager
[Name and title of authorized official, broker or agent (typewritten)]

State of ...New York.....)
) ss:
County of .....Erie.....)

Sworn to before me this
14th day of April, 2026

NOTARY PUBLIC FOR THE STATE OF New York

APRIL A. ADAMS
Notary Public, State of New York
Qualified in Erie County
Reg. No. 01AD6362624
My Commission Expires 08/07/2029

NEW YORK STATE | Workers' Compensation Board

CERTIFICATE OF INSURANCE COVERAGE

NYS DISABILITY AND PAID FAMILY LEAVE BENEFITS LAW

PART 1. To be completed by NYS disability and Paid Family Leave benefits carrier or licensed insurance agent of that carrier

1a. Legal Name & Address of Insured (use street address only)
ANDRON CONSTRUCTION CORP
21 ANDERSON LANE
GOLDENS BRIDGE, NY 10526

Work Location of Insured *(Only required if coverage is specifically limited to certain locations in New York State, i.e., Wrap-Up Policy)*

1b. Business Telephone Number of Insured
914-232-7531

1c. Federal Employer Identification Number of Insured or Social Security Number
132663790

2. Name and Address of Entity Requesting Proof of Coverage (Entity Being Listed as the Certificate Holder)
City of New York
c/o NYC Department of Design and Construction
30-30 Thomson Avenue
Long Island City, NY 11101

3a. Name of Insurance Carrier
ShelterPoint Life Insurance Company

3b. Policy Number of Entity Listed in Box "1a"
DBL69779

3c. Policy effective period
02/01/2026 to 01/31/2027

4. Policy provides the following benefits:
- [x] A. Both disability and paid family leave benefits.
- [ ] B. Disability benefits only.
- [ ] C. Paid family leave benefits only.

5. Policy covers:
- [x] A. All of the employer's employees eligible under the NYS Disability and Paid Family Leave Benefits Law.
- [ ] B. Only the following class or classes of employer's employees:

Under penalty of perjury, I certify that I am an authorized representative or licensed agent of the insurance carrier referenced above and that the named insured has NYS Disability and/or Paid Family Leave Benefits insurance coverage as described above.

Date Signed 4/14/2026 By _____
(Signature of insurance carrier's authorized representative or NYS Licensed Insurance Agent of that insurance carrier)

Telephone Number 516-829-8100 Name and Title Wade Harrison, President

IMPORTANT: If Boxes 4A and 5A are checked, and this form is signed by the insurance carrier's authorized representative or NYS Licensed Insurance Agent of that carrier, this certificate is COMPLETE. Mail it directly to the certificate holder.

If Box 4B, 4C or 5B is checked, this certificate is NOT COMPLETE for purposes of Section 220, Subd. 8 of the NYS Disability and Paid Family Leave Benefits Law. It must be emailed to PAU@wcb.ny.gov or it can be mailed for completion to the Workers' Compensation Board, Plans Acceptance Unit, PO Box 5200, Binghamton, NY 13902-5200.

PART 2. To be completed by the NYS Workers' Compensation Board (Only if Box 4B, 4C or 5B have been checked)

State of New York
Workers' Compensation Board

According to information maintained by the NYS Workers' Compensation Board, the above-named employer has complied with the NYS Disability and Paid Family Leave Benefits Law(Article 9 of the Workers' Compensation Law) with respect to all of their employees.

Date Signed _____ By _____
(Signature of Authorized NYS Workers' Compensation Board Employee)

Telephone Number _____ Name and Title _____

Please Note: *Only insurance carriers licensed to write NYS disability and paid family leave benefits insurance policies and NYS licensed insurance agents of those insurance carriers are authorized to issue Form DB-120.1.* ***Insurance brokers are NOT authorized to issue this form.***

CERTIFICATE OF
NYS WORKERS' COMPENSATION INSURANCE COVERAGE

1a. Legal Name & Address of Insured (use street address only) [illegible] 21 [illegible] [illegible] 1052[illegible]-1021 Work Location of Insured *(Only required if coverage is specifically limited to certain locations in New York State, i.e., a Wrap-Up Policy)*	1b. Business Telephone Number of Insured (914) 232-7531 1c. NYS Unemployment Insurance Employer Registration Number of Insured 15-[illegible]23104 1d. Federal Employer Identification Number of Insured or Social Security Number 13-2[illegible]37[illegible]0
2. Name and Address of Entity Requesting Proof of Coverage (Entity Being Listed as the Certificate Holder) City of New York c/o NYC Department of Design and Construction 30-30 Thomson Avenue [illegible]	3a. Name of Insurance Carrier Zurich American Insurance Co. 3b. Policy Number of Entity Listed in Box "1a" [illegible] 0380758 3c. Policy effective period 07[illegible]01[illegible]2025 to 07[illegible]01[illegible]202[illegible] 3d. The Proprietor, Partners or Executive Officers are ☐ included. (Only check box if all partners/officers included) ☐ all excluded or certain partners/officers excluded.

This certifies that the insurance carrier indicated above in box “3" insures the business referenced above in box “1a” for workers' compensation under the New York State Workers' Compensation Law. **(To use this form, New York (NY) must be listed under Item 3A on the INFORMATION PAGE of the workers' compensation insurance policy).** The Insurance Carrier or its licensed agent will send this Certificate of Insurance to the entity listed above as the certificate holder in box “2".

The insurance carrier must notify the above certificate holder and the Workers' Compensation Board within 10 days IF a policy is canceled due to nonpayment of premiums or within 30 days IF there are reasons other than nonpayment of premiums that cancel the policy or eliminate the insured from the coverage indicated on this Certificate. (These notices may be sent by regular mail.) **Otherwise, this Certificate is valid for one year after this form is approved by the insurance carrier or its licensed agent, or until the policy expiration date listed in box "3c", whichever is earlier.**

This certificate is issued as a matter of information only and confers no rights upon the certificate holder. This certificate does not amend, extend or alter the coverage afforded by the policy listed, nor does it confer any rights or responsibilities beyond those contained in the referenced policy.

This certificate may be used as evidence of a Workers' Compensation contract of insurance only while the underlying policy is in effect.

Please Note: Upon cancellation of the workers' compensation policy indicated on this form, if the business continues to be named on a permit, license or contract issued by a certificate holder, the business must provide that certificate holder with a new Certificate of Workers' Compensation Coverage or other authorized proof that the business is complying with the mandatory coverage requirements of the New York State Workers' Compensation Law.

Under penalty of perjury, I certify that I am an authorized representative or licensed agent of the insurance carrier referenced above and that the named insured has the coverage as depicted on this form.

Approved by: [illegible]
(Print name of authorized representative or licensed agent of insurance carrier)

Approved by: [signature] 4[illegible]14[illegible]202[illegible]
(Signature) (Date)

Title: [illegible]r[illegible]d [illegible]r[illegible]

Telephone Number of authorized representative or licensed agent of insurance carrier: (855) 874-0123

Please Note: Only insurance carriers and their licensed agents are authorized to issue Form C-105.2. Insurance brokers are NOT authorized to issue it.

Workers' Compensation Law

Section 57. Restriction on issue of permits and the entering into contracts unless compensation is secured.

1. The head of a state or municipal department, board, commission or office authorized or required by law to issue any permit for or in connection with any work involving the employment of employees in a hazardous employment defined by this chapter, and notwithstanding any general or special statute requiring or authorizing the issue of such permits, shall not issue such permit unless proof duly subscribed by an insurance carrier is produced in a form satisfactory to the chair, that compensation for all employees has been secured as provided by this chapter. Nothing herein, however, shall be construed as creating any liability on the part of such state or municipal department, board, commission or office to pay any compensation to any such employee if so employed.

2. The head of a state or municipal department, board, commission or office authorized or required by law to enter into any contract for or in connection with any work involving the employment of employees in a hazardous employment defined by this chapter, notwithstanding any general or special statute requiring or authorizing any such contract, shall not enter into any such contract unless proof duly subscribed by an insurance carrier is produced in a form satisfactory to the chair, that compensation for all employees has been secured as provided by this chapter.

Additional Instructions for Form DB-120.1

By signing this form, the insurance carrier identified in Box 3 on this form is certifying that it is insuring the business referenced in Box 1a for disability and/or Paid Family Leave benefits under the NYS Disability and Paid Family Leave Benefits Law. The insurance carrier or its licensed agent will send this Certificate of Insurance Coverage (Certificate) to the entity listed as the certificate holder in Box 2.

The insurance carrier must notify the above certificate holder and the Workers' Compensation Board within 10 days IF a policy is cancelled due to nonpayment of premiums or within 30 days IF there are reasons other than nonpayment of premiums that cancel the policy or eliminate the insured from coverage indicated on this Certificate. (These notices may be sent by regular mail.) Otherwise, this Certificate is valid for one year after this form is approved by the insurance carrier or its licensed agent, or until the policy expiration date listed in Box 3c, whichever is earlier.

This Certificate is issued as a matter of information only and confers no rights upon the certificate holder. This Certificate does not amend, extend or alter the coverage afforded by the policy listed, nor does it confer any rights or responsibilities beyond those contained in the referenced policy.

This Certificate may be used as evidence of a NYS disability and/or Paid Family Leave benefits contract of insurance only while the underlying policy is in effect.

Please Note: Upon the cancellation of the disability and/or Paid Family Leave benefits policy indicated on this form, if the business continues to be named on a permit, license or contract issued by a certificate holder, the business must provide that certificate holder with a new Certificate of Insurance Coverage for NYS disability and/ or Paid Family Leave Benefits or other authorized proof that the business is complying with the mandatory coverage requirements of the NYS Disability and Paid Family Leave Benefits Law.

NYS DISABILITY AND PAID FAMILY LEAVE BENEFITS LAW

§220. Subd. 8

(a) The head of a state or municipal department, board, commission or office authorized or required by law to issue any permit for or in connection with any work involving the employment of employees in employment as defined in this article, and not withstanding any general or special statute requiring or authorizing the issue of such permits, shall not issue such permit unless proof duly subscribed by an insurance carrier is produced in a form satisfactory to the chair, that the payment of disability benefits and after January first, two thousand and twenty-one, the payment of family leave benefits for all employees has been secured as provided by this article. Nothing herein, however, shall be construed as creating any liability on the part of such state or municipal department, board, commission or office to pay any disability benefits to any such employee if so employed.

(b) The head of a state or municipal department, board, commission or office authorized or required by law to enter into any contract for or in connection with any work involving the employment of employees in employment as defined in this article and notwithstanding any general or special statute requiring or authorizing any such contract, shall not enter into any such contract unless proof duly subscribed by an insurance carrier is produced in a form satisfactory to the chair, that the payment of disability benefits and after January first, two thousand eighteen, the payment of family leave benefits for all employees has been secured as provided by this article.

LABOR LAW ARTICLE 8 - NYC PUBLIC WORKS

Workers, Laborers and Mechanics employed on a public work project must receive not less than the prevailing rate of wage and benefits for the classification of work performed by each upon such public work. Pursuant to New York Labor Law Article 8 the Comptroller of the City of New York has promulgated this schedule solely for Workers, Laborers and Mechanics engaged by private contractors on New York City public work projects. Prevailing rates are required to be annexed to and form part of the public work contract pursuant to Labor Law section 220 (3).

This schedule is a compilation of separate determinations of the prevailing rate of wage and supplements made by the Comptroller for each trade classification listed herein pursuant to Labor Law section 220 (5). The source of the wage and supplement rates, whether a collective bargaining agreement, survey data or other, is listed at the end of each classification.

Agency Chief Contracting Officers should contact the Bureau of Labor Law's Classification Unit with any questions concerning trade classifications, prevailing rates or prevailing practices with respect to procurement on New York City public work contracts. Contractors are advised to review the Comptroller's Prevailing Wage Schedule before bidding on public work contracts. Contractors with questions concerning trade classifications, prevailing rates or prevailing practices with respect to public work contracts in the procurement stage must contact the contracting agency responsible for the procurement.

Any error as to compensation under the prevailing wage law or other information as to trade classification, made by the contracting agency in the contract documents or in any other communication, will not preclude a finding against the contractor of prevailing wage violation.

Any questions concerning trade classifications, prevailing rates or prevailing practices on New York City public work contracts that have already been awarded may be directed to the Bureau of Labor Law's Classification Unit by calling (212) 669-4443. All callers must have the agency name and contract registration number available when calling with questions on public work contracts. Please direct all other compliance issues to: laborlaw@comptroller.nyc.gov or Bureau of Labor Law, Attn: Paul Brumlik, Office of the Comptroller, 1 Centre Street, Room 651, New York, N.Y. 10007.

Pursuant to Labor Law § 220 (3-a) (a), the appropriate schedule of prevailing wages and benefits must be posted in a prominent and accessible place at all public work sites along with the Construction Poster provided on our web site at comptroller.nyc.gov/wages. In addition, covered employees must be given the appropriate schedule of prevailing wages and benefits along with the Worker Notice provided on our web site at the time the public work project begins, and with the first paycheck to each such employee after July first of each year.

This schedule is applicable to work performed during the effective period, unless otherwise noted. Changes to this schedule are published on our web site comptroller.nyc.gov/wages. Contractors must pay the wages and supplements in effect when the worker, laborer, mechanic performs the work. Preliminary schedules for future one-year periods appear in the City Record on or about June 1 each succeeding year. Final schedules appear on or about July 1 in the City Record and on our web site comptroller.nyc.gov/wages.

Prevailing rates and ratios for apprentices are published in the Construction Apprentice Prevailing Wage Schedule. Pursuant to Labor Law § 220 (3-e), only apprentices who are individually

registered in a bona fide program to which the employer contractor is a participant, registered with the New York State Department of Labor, may be paid at the apprentice rates. Apprentices who are not so registered must be paid as journey persons.

New York City public work projects awarded pursuant to a Project Labor Agreement ("PLA") in accordance with Labor Law section 222 may have different labor standards for shift, premium and overtime work. Please refer to the PLA's pre-negotiated labor agreements for wage and benefit rates applicable to work performed outside of the regular workday. More information is available at the Mayor's Office of Contract Services (MOCS) web page at:

https://www.nyc.gov/site/mocs/regulations/project-labor-agreements.page

All the provisions of Labor Law Article 8 remain applicable to PLA work including, but not limited to, the enforcement of prevailing wage requirements by the Comptroller in accordance with the trade classifications in this schedule; however, we will enforce shift, premium, overtime and other non-standard rates as they appear in a project's pre-negotiated labor agreement.

In order to meet their obligation to provide prevailing supplemental benefits to each covered employee, employers must either:

1) **Provide bona fide fringe benefits which cost the employer no less than the prevailing supplemental benefits rate; or**
2) **Supplement the employee's hourly wage by an amount no less than the prevailing supplemental benefits rate; or**
3) **Provide a combination of bona fide fringe benefits and wage supplements which cost the employer no less than the prevailing supplemental benefits rate in total.**

Although prevailing wage laws do not require employers to provide bona fide fringe benefits (as opposed to wage supplements) to their employees, other laws may. For example, the Employee Retirement Income Security Act, 29 U.S.C. § 1001 et seq., the Patient Protection and Affordable Care Act, 42 U.S.C. § 18001 et seq., and the New York City Paid Sick Leave Law, N.Y.C. Admin. Code § 20-911 et seq., require certain employers to provide certain benefits to their employees. Labor agreements to which employers are a party may also require certain benefits. The Comptroller's Office does not enforce these laws or agreements.

Employers must provide prevailing supplemental benefits at the straight time rate for each hour worked unless otherwise noted in the classification.

Paid Holidays, Vacation and Sick Leave when listed must be paid or provided in addition to the prevailing hourly supplemental benefit rate.

For more information, please refer to the Comptroller's Prevailing Wage Law Regulations in Title 44 of the Rules of the City of New York, Chapter 2, available at comptroller.nyc.gov/wages.

Paul Brumlik
Director of Classifications
Bureau of Labor Law

TABLE OF CONTENTS

CLASSIFICATION	PAGE
ASBESTOS HANDLER	5
BLASTER	5
BOILERMAKER	6
BRICKLAYER	7
CARPENTER - BUILDING COMMERCIAL	8
CARPENTER - HEAVY CONSTRUCTION WORK	9
CARPENTER - HIGH RISE CONCRETE FORMS	10
CARPENTER - SIDEWALK SHED, SCAFFOLD AND HOIST	11
CARPENTER - WOOD WATER STORAGE TANK	12
CEMENT & CONCRETE WORKER	13
CEMENT MASON	14
CORE DRILLER	15
DERRICKPERSON AND RIGGER	16
DIVER	17
DOCKBUILDER - PILE DRIVER	18
DRIVER: TRUCK (TEAMSTER)	19
ELECTRICIAN	21
ELECTRICIAN - ALARM TECHNICIAN	28
ELECTRICIAN-STREET LIGHTING WORKER	29
ELEVATOR CONSTRUCTOR	31
ELEVATOR REPAIR & MAINTENANCE	31
ENGINEER	32
ENGINEER - CITY SURVEYOR AND CONSULTANT	38
ENGINEER - FIELD (BUILDING CONSTRUCTION)	39
ENGINEER - FIELD (HEAVY CONSTRUCTION)	40
ENGINEER - FIELD (STEEL ERECTION)	41
ENGINEER - OPERATING	42
FLAGGER	50
FLOOR COVERER	51
GLAZIER	52
GLAZIER - REPAIR & MAINTENANCE	53
HAZARDOUS MATERIAL HANDLER	54
HEAT AND FROST INSULATOR	54
HOUSE WRECKER	55
IRON WORKER - ORNAMENTAL	56
IRON WORKER - STRUCTURAL	57
LABORER – HEAVY & HIGHWAY	58
LABORER - PAVER & ROADBUILDER	59

LABORER - PAVER & ROADBUILDER LINE STRIPING (ROADWAY) 61
LANDSCAPING 62
MARBLE MECHANIC 64
MASON TENDER 66
MASON TENDER (INTERIOR DEMOLITION WORKER) 66
METALLIC LATHER 67
MILLWRIGHT 68
MOSAIC MECHANIC 69
PAINTER 70
PAINTER - BRIDGE & STRUCTURAL STEEL 71
PAINTER - METAL POLISHER 72
PAINTER - SIGN 73
PAPERHANGER 74
PLASTERER 75
PLASTERER - TENDER 76
PLUMBER 77
PLUMBER (MECHNICAL EQUIPMENT AND SERVICE) 78
PLUMBER (RESIDENTIAL RATES FOR 1, 2 AND 3 FAMILY HOME CONSTRUCTION) 79
PLUMBER: PUMP & TANK 80
POINTER, WATERPROOFER, CAULKER, SANDBLASTER, STEAMBLASTER 81
ROOFER 81
SHEET METAL WORKER 82
SHEET METAL WORKER - SPECIALTY 83
SHIPYARD WORKER 84
SIGN ERECTOR 86
STEAMFITTER 87
STEAMFITTER - REFRIGERATION AND AIR CONDITIONER 88
STONE MASON - SETTER 89
TAPER 89
TELECOMMUNICATION WORKER 90
TILE FINISHER 91
TILE LAYER - SETTER 92
TIMBERPERSON 93
TUNNEL WORKER 94
UTILITY LOCATOR 96
WELDER 98

ASBESTOS HANDLER

SEE HAZARDOUS MATERIAL HANDLER

BLASTER

Blaster

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $58.81
Supplemental Benefit Rate per Hour: $55.73

Blaster - Hydraulic Trac Drill

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $52.95
Supplemental Benefit Rate per Hour: $55.73

Blaster - Wagon: Air Trac: Quarry Bar: Drillrunners

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $52.12
Supplemental Benefit Rate per Hour: $55.73

Blaster - Journeyperson

(Laborer, Chipper/Jackhammer including Walk Behind Self Propelled Hydraulic Asphalt and Concrete Breakers and Hydro (Water) Demolition, Powder Carrier, Hydraulic Chuck Tender, Chuck Tender and Nipper)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $45.60
Supplemental Benefit Rate per Hour: $55.73

Blaster - Magazine Keepers: (Watch Person)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $22.80
Supplemental Benefit Rate per Hour: $55.73

Overtime Description

Paid Holidays: Labor Day, Thanksgiving Day.

Excluding Supplemental Benefits.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Thanksgiving Day
Christmas Day

Shift Rates
When two shifts are employed, single time rate shall be paid for each shift. When three shifts are found necessary, each shift shall work seven and one half hours (7 ½), but shall be paid for eight (8) hours of labor, and be permitted one half hour for lunch.

(Local #731)

BOILERMAKER

Boilermaker

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $68.88
Supplemental Benefit Rate per Hour: $49.83
Supplemental Note: For time and one half overtime - $74.17 For double overtime - $98.51

Overtime Description
For Repair and Maintenance work:
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
For New Construction work:
Double time the regular rate after an 8 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).

New Year's Day
President's Day
Memorial Day
Independence Day
Columbus Day
Election Day
Veteran's Day
Thanksgiving Day
Christmas Day

Quadruple time the regular rate for work on the following holiday(s).
Labor Day

Paid Holidays

Good Friday
Day after Thanksgiving
Day before Christmas
Day before New Year's Day

Shift Rates

On jobs requiring two (2) or three (3) shifts, the first shift shall work eight (8) hours at the regular straight-time hourly rate. The second shift shall work eight (8) hours and receive eight hours at the regular straight time hourly rate plus two dollars ($2.00) per hour. The third shift shall work eight (8) hours and receive eight hours at the regular straight time hourly rate plus two dollars and twenty-five cents ($2.25) per hour.

(Local #5)

BRICKLAYER

Bricklayer

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $60.04
Supplemental Benefit Rate per Hour: $45.35

Overtime Description

Time and one half the regular rate after a 7 hour day. If working on a job that is predominately Pointer, Cleaner, Caulker work, then Time and one half the regular rate after an 8 hour day.

Overtime

Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays

None

Shift Rates

The second shift wage rate shall be a 15% wage premium with no premium for supplemental benefits. There must be a first shift in order to work a second shift. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, eight hours will be paid at straight time rate for seven hours of work.

(Bricklayer District Council)

CARPENTER - BUILDING COMMERCIAL

Building Commercial

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $59.05
Supplemental Benefit Rate per Hour: $49.08

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day

Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
The second shift will receive one hour at the double time rate of pay for the last hour of the shift; eight hours pay for seven hours of work, nine hours pay for eight hours of work. There must be a first shift in order to work a second shift. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, the rule for the second shift will apply.

(Carpenters District Council)

CARPENTER - HEAVY CONSTRUCTION WORK
(Construction of Engineered Structures and Building Foundations including all form work)

Heavy Construction Work

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $61.59
Supplemental Benefit Rate per Hour: $56.84

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
Off shift work commencing between 5:00 P.M. and 11:00 P.M. shall work eight and one half hours allowing for one half hour for lunch. The wage rate shall be 113% of the straight time hourly wage rate and the supplemental benefits shall be paid at the straight time rate. When two (2) or more shifts of Carpenters are employed, single time will be paid for each shift.

(Carpenters District Council)

CARPENTER - HIGH RISE CONCRETE FORMS
(Excludes Engineered Structures and Building Foundations)

Carpenter High Rise A

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $51.48
Supplemental Benefit Rate per Hour: $44.74

Carpenter High Rise B

Carpenter High Rise B worker is excluded from high risk operations such as erection decking, perimeter debris netting, leading edge work, self-climbing form systems, and the installation of cocoon systems unless directly supervised by a Carpenter High Rise A worker.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $40.89
Supplemental Benefit Rate per Hour: $18.05

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday

Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
The second shift wage rate shall be 113% of the straight time hourly wage rate. However, any shift beginning after 5:00 P.M. shall be paid at time and one half the regular hourly rate. There must be a first shift in order to work a second shift. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, the rule for the second shift will apply.

(Carpenters District Council)

CARPENTER - SIDEWALK SHED, SCAFFOLD AND HOIST

Carpenter - Hod Hoist

(Assisted by Mason Tender)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $56.20
Supplemental Benefit Rate per Hour: $49.95

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day

Columbus Day
Presidential Election Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
The second shift will receive 112% of the straight time hourly rate. Benefit fund contributions shall be paid at the straight time rate. There must be a first shift in order to work a second shift. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, the rule for the second shift will apply.

(Carpenters District Council)

CARPENTER - WOOD WATER STORAGE TANK

Tank Mechanic

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $38.83
Supplemental Benefit Rate per Hour: $26.06

Tank Helper

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $30.44
Supplemental Benefit Rate per Hour: $26.06

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Time and one half the regular rate for work on a holiday plus the day's pay.

Paid Holidays
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day

Columbus Day
Thanksgiving Day
Day after Thanksgiving
1/2 day on Christmas Eve if work is performed in the A.M.
Christmas Day
1/2 day on New Year's Eve if work is performed in the A.M.

Vacation

Employed for one (1) year.....one (1) week vacation (40 hours)
Employed for three (3) years.....two (2) weeks vacation (80 hours)
Employed for more than twenty (20) years.....three (3) weeks vacation (120 hours)

SICK LEAVE:
Two (2) sick days after being employed for twenty (20) years.

(Carpenters District Council)

CEMENT & CONCRETE WORKER

Building Work

Cement & Concrete Worker

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $47.28
Supplemental Benefit Rate per Hour: $34.20
Supplemental Note: $39.20 on Saturdays; $44.20 on Sundays & Holidays

Cement & Concrete Worker - (Hired after 2/6/2016)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $36.80
Supplemental Benefit Rate per Hour: $26.20
Supplemental Note: $29.20 on Saturdays; $32.20 on Sundays & Holidays

Overtime Description

Time and one half the regular rate after 7 hour day (time and one half the regular rate after an 8 hour day when working with Dockbuilders on pile cap forms and for work below street level to the top of the foundation wall, not to exceed 2 feet or 3 feet above the sidewalk-brick shelf, when working on the foundation and structure.)

Overtime

Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays

1/2 day before Christmas Day
1/2 day before New Year's Day

Shift Rates

On shift work extending over a twenty-four hour period, all shifts are paid at straight time.

(Cement & Concrete Workers District Council 16)

CEMENT MASON

Cement Mason

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $59.87
Supplemental Benefit Rate per Hour: $34.76
Supplemental Note: Supplemental benefit time and one half rate: $63.22; Double time rate: double the base supplemental benefit rate.

Overtime Description

Time and one-half the regular rate after an 8 hour day, double time the regular rate after 10 hours. Time and one-half the regular rate on Saturday, double time the regular rate after 10 hours. Double time the regular rate on Sunday. Four Days a week at Ten (10) hours straight time is allowed.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day

Thanksgiving Day
Christmas Day

Paid Holidays

Any worker who reports to work on Christmas Eve or New Year's Eve pursuant to his employer's instruction shall be entitled to three (3) hours afternoon pay without working.

Shift Rates

For off shift work, (at times other than the regular 7:00 A.M. to 3:30 P.M. work day) a cement mason shall be paid at the regular hourly rate plus a 25% per hour differential.

(Local #780) (BCA)

CORE DRILLER

Test Boring

Core Driller

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $47.88
Supplemental Benefit Rate per Hour: $34.35

Core Driller Helper

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $37.58
Supplemental Benefit Rate per Hour: $34.35

Core Driller Helper(Third year in the industry)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $33.80
Supplemental Benefit Rate per Hour: $34.35

Core Driller Helper (Second year in the industry)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $30.04
Supplemental Benefit Rate per Hour: $34.35

Core Driller Helper (First year in the industry)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $26.26
Supplemental Benefit Rate per Hour: $34.35

Overtime Description
Time and one half the regular rate for work on a holiday plus Holiday pay when worked.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Time and one half the regular rate for work on the following holiday(s).

Paid Holidays
New Year's Day
Memorial Day
Independence Day
Labor Day
Veteran's Day
Thanksgiving Day
Christmas Day

Shift Rates
When two (2) or more shifts are employed, single time shall be paid for each shift, but those employees employed on a shift other than from 8:00 A.M. to 5:00 P.M. shall, in addition, receive two dollars ($2.00) per hour differential for each hour worked. When three (3) shifts are needed, each shift shall work seven and one-half (7 ½) hours paid for eight (8) hours of labor and be permitted one-half (½) hour for mealtime.

(Carpenters District Council)

DERRICKPERSON AND RIGGER

Derrick Person & Rigger

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $61.11
Supplemental Benefit Rate per Hour: $62.71

Derrick Person & Rigger - Site Work

Assists the Stone Mason-Setter in the setting of stone and paving stone.

Effective Period: 7/1/2025 - 6/30/2026

Wage Rate per Hour: $48.40
Supplemental Benefit Rate per Hour: $49.70

Overtime Description
The first two hours of overtime on weekdays and the first seven hours of work on Saturdays are paid at time and one half for wages and supplemental benefits. All additional overtimes is paid at double time for wages and supplemental benefits.

Overtime
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Washington's Birthday
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
1/2 day on Christmas Eve if work is performed in the A.M.

(Local #197)

DIVER

Diver (Marine)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $76.46
Supplemental Benefit Rate per Hour: $56.84

Diver Tender (Marine)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $56.00
Supplemental Benefit Rate per Hour: $56.84

Overtime
Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays

None

Shift Rates

When three shifts are utilized each shift shall work seven and one half-hours (7 1/2 hours) and paid for 8 hours, allowing for one half hour for lunch.

(Carpenters District Council)

DOCKBUILDER - PILE DRIVER

Dockbuilder - Pile Driver

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $61.59
Supplemental Benefit Rate per Hour: $56.84

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day

Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays

None

Shift Rates

Off shift work commencing between 5:00 P.M. and 11:00 P.M. shall work eight and one half hours allowing for one half hour for lunch. The wage rate shall be 113% of the straight time hourly wage rate and the supplemental benefits shall be paid at the straight time rate. When two (2) or more shifts of Dockbuilders are employed, single time will be paid for each shift.

(Carpenters District Council)

DRIVER: TRUCK (TEAMSTER)

Including work involving the delivery to and hauling from such worksites of aggregate supply construction materials and any time spent loading/unloading

Driver - Dump Truck

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $46.12
Supplemental Benefit Rate per Hour: $59.65
Supplemental Note: Over 40 hours worked: at time and one half rate - $25.50; at double time rate - $34.00

Driver - Tractor Trailer

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $48.82
Supplemental Benefit Rate per Hour: $57.65
Supplemental Note: Over 40 hours worked: at time and one half rate - $26.33; at double time rate - $35.10

Driver - Euclid & Turnapull Operator

Effective Period: 7/1/2025 - 6/30/2026

Wage Rate per Hour: $49.38
Supplemental Benefit Rate per Hour: $57.65
Supplemental Note: Over 40 hours worked: at time and one half rate - $26.33; at double time rate - $35.10

Overtime Description

For Paid Holidays: Holiday pay for all holidays shall be prorated based two hours per day for each day worked in the holiday week, not to exceed 8 hours of holiday pay.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day

Shift Rates

Off shift work commencing between 6:00 P.M. and 5:00 A.M. shall work eight and one half (8 1/2) hours allowing for one half hour for lunch

---

Driver Redi-Mix (Sand & Gravel)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $44.50
Supplemental Benefit Rate per Hour: $52.22
Supplemental Note: Over 40 hours worked: time and one half rate $22.35; double time rate $29.80

Overtime Description

For Paid Holidays: Employees who do not work on a contractual holiday shall be compensated two (2) hours extra pay in straight time wages and benefits for every day on which the Employee does not pass up a day's work during the calendar week (Sunday through Saturday) of the holiday, up to a maximum of ten (10) hours in wages and eight (8) hours in benefit contributions for the holiday

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
Martin Luther King Jr. Day
President's Day
Columbus Day
Veteran's Day

Triple time the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Thanksgiving Day
Christmas Day

(Local #282)

ELECTRICIAN

(Including installation of low voltage cabling carrying data, video and/or voice on building construction/alteration/renovation projects.)

Electrician "A" (Regular Day / Day Shift)

Effective Period: 7/1/2025 - 1/1/2026
Wage Rate per Hour: $62.00
Supplemental Benefit Rate per Hour: $66.90
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 1/2/2026 - 4/15/2026
Wage Rate per Hour: $62.00
Supplemental Benefit Rate per Hour: $67.40
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $64.00
Supplemental Benefit Rate per Hour: $70.28
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician "A" (Regular Day Overtime after 7 hrs / Day Shift Overtime after 8 hrs)

Effective Period: 7/1/2025 - 1/1/2026
Wage Rate per Hour: $93.00
Supplemental Benefit Rate per Hour: $68.90
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 1/2/2026 - 4/15/2026
Wage Rate per Hour: $93.00
Supplemental Benefit Rate per Hour: $69.40
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $96.00
Supplemental Benefit Rate per Hour: $72.34
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician "A" (Swing Shift)

Effective Period: 7/1/2025 - 1/1/2026
Wage Rate per Hour: $72.75
Supplemental Benefit Rate per Hour: $75.27
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 1/2/2026 - 4/15/2026
Wage Rate per Hour: $72.75
Supplemental Benefit Rate per Hour: $75.77
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $75.10
Supplemental Benefit Rate per Hour: $78.93

*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician "A" (Swing Shift Overtime after 7.5 hours)

Effective Period: 7/1/2025 - 1/1/2026
Wage Rate per Hour: $109.13
Supplemental Benefit Rate per Hour: $77.61
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 1/2/2026 - 4/15/2026
Wage Rate per Hour: $109.13
Supplemental Benefit Rate per Hour: $78.11
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $112.65
Supplemental Benefit Rate per Hour: $81.35
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician "A" (Graveyard Shift)

Effective Period: 7/1/2025 - 1/1/2026
Wage Rate per Hour: $81.49
Supplemental Benefit Rate per Hour: $82.39
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 1/2/2026 - 4/15/2026
Wage Rate per Hour: $81.49
Supplemental Benefit Rate per Hour: $82.89
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $84.12
Supplemental Benefit Rate per Hour: $86.28
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician "A" (Graveyard Shift Overtime after 7 hours)

Effective Period: 7/1/2025 - 1/1/2026
Wage Rate per Hour: $122.24
Supplemental Benefit Rate per Hour: $85.01
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 1/2/2026 - 4/15/2026
Wage Rate per Hour: $122.24
Supplemental Benefit Rate per Hour: $85.51
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $126.18
Supplemental Benefit Rate per Hour: $88.98
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

*** Supplemental Benefit Rate per Hour Note**
In addition to the Supplemental Benefit Rates per Hour listed above, the employer must provide an additional 6.2% of taxable gross pay earned on covered work only. This additional Supplemental Benefit Rate will terminate when the employee has contributed the maximum annual Social Security tax required by law, on all work performed.

Overtime
Time and one half the regular rate after a 7 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Time and one half the regular rate for work on a holiday.
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
For multiple shifts of temporary light and/or power, the temporary light and/or power employee shall be paid for 8 hours at the straight time rate. For three or less workers performing 8 hours temporary light and/or power the supplemental benefit rate is $26.99, effective 1/2/2026 the supplemental benefit rate is $27.49, effective 4/16/2026 the supplemental benefit rate is $27.91 - See * Supplemental Benefit Rate per Hour Note above.

Electrician "M" 1st Year

"M" rated work shall be defined as jobbing: electrical work of limited duration and scope, also consisting of repairs and/or replacement of electrical and tele-data equipment. Includes all work necessary to retrofit, service, maintain and repair all kinds of lighting fixtures and local lighting controls and washing and cleaning of foregoing fixtures.

Effective Period: 7/1/2025 - 4/15/2026

Wage Rate per Hour: $27.50
Supplemental Benefit Rate per Hour: $26.29

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $27.50
Supplemental Benefit Rate per Hour: $26.79

Electrician "M" 1st Year (Overtime)

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $41.25
Supplemental Benefit Rate per Hour: $28.02

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $41.25
Supplemental Benefit Rate per Hour: $28.52

Electrician "M" 2nd Year

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $28.50
Supplemental Benefit Rate per Hour: $26.82

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $28.50
Supplemental Benefit Rate per Hour: $27.32

Electrician "M" 2nd Year (Overtime)

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $42.75
Supplemental Benefit Rate per Hour: $28.62

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $42.75
Supplemental Benefit Rate per Hour: $29.12

Electrician "M" 3rd Year

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $30.50
Supplemental Benefit Rate per Hour: $27.90

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $30.50
Supplemental Benefit Rate per Hour: $28.40

Electrician "M" 3rd Year (Overtime)

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $45.75
Supplemental Benefit Rate per Hour: $29.83

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $45.75
Supplemental Benefit Rate per Hour: $30.33

Electrician "M" 4th Year

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $33.50
Supplemental Benefit Rate per Hour: $29.51

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $33.50
Supplemental Benefit Rate per Hour: $30.01

Electrician "M" 4th Year (Overtime)

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $50.25
Supplemental Benefit Rate per Hour: $31.63

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $50.25
Supplemental Benefit Rate per Hour: $32.13

Electrician "M" 5th Year

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $36.50
Supplemental Benefit Rate per Hour: $31.12

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $36.50
Supplemental Benefit Rate per Hour: $31.62

Electrician "M" 5th Year (Overtime)

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $54.75
Supplemental Benefit Rate per Hour: $33.43

Effective Period: 4/16/2026 - 6/30/2026

Wage Rate per Hour: $54.75
Supplemental Benefit Rate per Hour: $33.93

Electrician "M" 6th Year

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $43.50
Supplemental Benefit Rate per Hour: $34.89

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $43.50
Supplemental Benefit Rate per Hour: $35.39

Electrician "M" 6th Year (Overtime)

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $65.25
Supplemental Benefit Rate per Hour: $37.64

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $65.25
Supplemental Benefit Rate per Hour: $38.14

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

(Local #3)

ELECTRICIAN - ALARM TECHNICIAN

(Scope of Work - Inspect, test, repair, and replace defective, malfunctioning, or broken devices, components and controls of Fire, Burglar and Security Systems)

Alarm Technician

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $37.40
Supplemental Benefit Rate per Hour: $21.44
Supplemental Note: $19.31 only after 8 hours worked in a day

Overtime Description

Time and one half the regular rate for work on the following holidays: Columbus Day, Veterans Day, Day after Thanksgiving.
Double time the regular rate for work on the following holidays: New Year's day, Martin Luther King Jr. Day, President's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates

Night Differential is based upon a ten percent (10%) differential between the hours of 4:00 P.M. and 12:30 A.M. and a fifteen percent (15%) differential for the hours 12:00 A.M. to 8:30 A.M.

Vacation

At least 1 year of employment.....ten (10) days
5 years or more of employment.....fifteen (15) days
10 years of employment.....twenty (20) days
Plus one Personal Day per year

Sick Days:
One day per Year. Up to 4 vacation days may be used as sick days.

(Local #3)

ELECTRICIAN-STREET LIGHTING WORKER

Electrician - Electro Pole Electrician

Effective Period: 7/1/2025 - 12/31/2025
Wage Rate per Hour: $62.00
Supplemental Benefit Rate per Hour: $69.01
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 1/1/2026 - 4/21/2026
Wage Rate per Hour: $62.00
Supplemental Benefit Rate per Hour: $69.51
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/22/2026 - 6/30/2026
Wage Rate per Hour: $64.00
Supplemental Benefit Rate per Hour: $72.46
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician - Electro Pole Foundation Installer

Effective Period: 7/1/2025 - 12/31/2025
Wage Rate per Hour: $47.66
Supplemental Benefit Rate per Hour: $51.27
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 1/1/2026 - 4/21/2026
Wage Rate per Hour: $47.66
Supplemental Benefit Rate per Hour: $51.77
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Effective Period: 4/22/2026 - 6/30/2026
Wage Rate per Hour: $49.66
Supplemental Benefit Rate per Hour: $53.91
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

Electrician - Electro Pole Maintainer

Effective Period: 7/1/2025 - 12/31/2025
Wage Rate per Hour: $41.61

Supplemental Benefit Rate per Hour: $46.32

Effective Period: 1/1/2026 - 4/21/2026
Wage Rate per Hour: $41.61
Supplemental Benefit Rate per Hour: $46.82

Effective Period: 4/22/2026 - 6/30/2026
Wage Rate per Hour: $43.61
Supplemental Benefit Rate per Hour: $48.96
*** Supplemental Note: See Supplemental Benefit Rate per Hour Note below**

*** Supplemental Benefit Rate per Hour Note**
In addition to the Supplemental Benefit Rates per Hour listed above, the employer must provide an additional 6.2% of taxable gross pay earned on covered work only. This additional Supplemental Benefit Rate will terminate when the employee has contributed the maximum annual Social Security tax required by law, on all work performed.

Overtime Description

Electrician - Electro Pole Electrician: Time and one half the regular rate after a 7 hour day and after 5 consecutive days worked per week.
Electrician - Electro Pole Foundation Installer: Time and one half the regular rate after 8 hours within a 24 hour period and Saturday and Sunday.
Electrician - Electro Pole Maintainer: Time and one half the regular rate after a 7 hour day and after 5 consecutive days worked per week. Saturdays and Sundays may be used as a make-up day at straight time when a day is lost during the week to inclement weather.

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays

None

(Local #3)

ELEVATOR CONSTRUCTOR

Elevator Constructor

Effective Period: 7/1/2025 - 3/16/2026
Wage Rate per Hour: $83.27
Supplemental Benefit Rate per Hour: $42.33

Effective Period: 3/17/2026 - 6/30/2026
Wage Rate per Hour: $86.43
Supplemental Benefit Rate per Hour: $43.43

Overtime Description
For New Construction: work performed after an 8 hour day, Saturday, Sunday or between 5:30pm and 6:00am shall be paid at double time rate.

Existing buildings: work performed after an 8 hour day, Saturday, Sunday or between 6:00pm and 5:00 am shall be paid time and one half.

Overtime
Double time the regular rate for work on the following holiday(s).

Paid Holidays
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Vacation
Employer contributes 8% of regular basic hourly rate as vacation pay for employees with more than 15 years of service, and 6% for employees with 5 to 15 years of service, and 4% for employees with less than 5 years of service.

(Local #1)

ELEVATOR REPAIR & MAINTENANCE

Elevator Service/Modernization Mechanic

Effective Period: 7/1/2025 - 3/16/2026
Wage Rate per Hour: $65.54
Supplemental Benefit Rate per Hour: $42.28

Effective Period: 3/17/2026 - 6/30/2026
Wage Rate per Hour: $68.06
Supplemental Benefit Rate per Hour: $43.38

Overtime Description
For Scheduled Service Work: Double time - work scheduled in advance by two or more workers performed on Sundays, Holidays, and between midnight and 5:00am.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.
Time and one half the regular rate for work on a holiday plus the day's pay.

Paid Holidays
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates
Afternoon shift - regularly hourly rate plus a (15%) fifteen percent differential. Graveyard shift - time and one half the regular rate.

Vacation
Employer contributes 8% of regular basic hourly rate as vacation pay for employees with more than 15 years of service, and 6% for employees with 5 to 15 years of service, and 4% for employees with less than 5 years of service.

(Local #1)

ENGINEER

Engineer - Heavy Construction Operating Engineer I

Cherrypickers 20 tons and over and Loaders (rubber tired and/or tractor type with a manufacturer's minimum rated capacity of six cubic yards and over).

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $78.33
Supplemental Benefit Rate per Hour: $50.01
Supplemental Note: $92.62 on overtime
Shift Wage Rate: $125.33

Engineer - Heavy Construction Operating Engineer II

Backhoes, Basin Machines, Groover, Mechanical Sweepers, Bobcat, Boom Truck, Barrier Transport (Barrier Mover) & machines of similar nature. Operation of Churn Drills and machines of a similar nature, Stetco Silent Hoist and machines of similar nature, Vac-Alls, Meyers Machines, John Beam and machines of a similar nature, Ross Carriers and Travel Lifts and machines of a similar nature, Bulldozers, Scrapers and Turn-a-Pulls: Tugger Hoists (Used exclusively for handling excavated material); Tractors with attachments, Hyster and Roustabout Cranes, Cherrypickers. Austin Western, Grove and machines of a similar nature, Scoopmobiles, Monorails, Conveyors, Trenchers: Loaders-Rubber Tired and Tractor: Barber Greene and Eimco Loaders and Eimco Backhoes; Mighty Midget and similar breakers and Tampers, Curb and Gutter Pavers and Motor Patrol, Motor Graders and all machines of a similar nature. Locomotives 10 Tons or under. Mini-Max, Break-Tech and machines of a similar nature; Milling machines, robotic and demolition machines and machines of a similar nature, shot blaster, skid steer machines and machines of a similar nature including bobcat, pile rig rubber-tired excavator (37,000 lbs. and under), 2 person auger.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $75.84
Supplemental Benefit Rate per Hour: $50.01
Supplemental Note: $92.62 on overtime
Shift Wage Rate: $121.34

Engineer - Heavy Construction Operating Engineer III

Minor Equipment such as Tractors, Post Hole Diggers, Ditch Witch (Walk Behind), Road Finishing Machines, Rollers five tons and under, Tugger Hoists, Dual Purpose Trucks, Fork Lifts, and Dempsey Dumpers, Fireperson.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $71.70
Supplemental Benefit Rate per Hour: $50.01
Supplemental Note: $92.62 on overtime
Shift Wage Rate: $114.72

Engineer - Heavy Construction Maintenance Engineer I

Installing, Repairing, Maintaining, Dismantling of all equipment including Steel Cutting, Bending and Heat Sealing Machines, Mechanical Heaters, Grout Pumps, Bentonite Pumps & Plants, Screening Machines, Fusion Coupling Machines, Tunnel Boring Machines Moles and Machines of a similar nature, Power Packs, Mechanical Hydraulic Jacks; all drill rigs including but not limited to Churn, Rotary Caisson, Raised Bore & Drills of a similar nature; Personnel, Inspection & Safety Boats or any boats used to perform functions of same, Mine Hoists, Whirlies, all Climbing Cranes, all Tower Cranes, including but not limited to Truck Mounted and Crawler Type and machines of similar nature; Maintaining Hydraulic Drills and machines of a similar nature; Well Point System-

Installation and dismantling; Burning, Welding, all Pumps regardless of size and/or motor power, except River Cofferdam Pumps and Wells Point Pumps; Motorized Buggies (three or more); equipment used in the cleaning and televising of sewers, but not limited to jet-rodder/vacuum truck, vacall/vactor, closed circuit television inspection equipment; high powered water pumps, jet pumps; screed machines and concrete finishing machines of a similar nature; vermeers.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $75.45
Supplemental Benefit Rate per Hour: $50.01
Supplemental Note: $92.62 on overtime
Shift Wage Rate: $120.72

Engineer - Heavy Construction Maintenance Engineer II

On Base Mounted Tower Cranes

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $100.74
Supplemental Benefit Rate per Hour: $50.01
Supplemental Note: $92.62 on overtime
Shift Wage Rate: $161.18

Engineer - Heavy Construction Maintenance Engineer III

On Generators, Light Towers

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $48.02
Supplemental Benefit Rate per Hour: $50.01
Supplemental Note: $92.62 on overtime
Shift Wage Rate: $76.83

Engineer - Heavy Construction Maintenance Engineer IV

On Pumps and Mixers including mud sucking

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $49.39
Supplemental Benefit Rate per Hour: $50.01
Supplemental Note: $92.62 on overtime
Shift Wage Rate: $79.02

Engineer - Heavy Construction Service Engineer

Gradalls: Concrete Pumps: Power Houses: Driving Truck Cranes: Driving and Operating Fuel and Grease Trucks.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $67.50
Supplemental Benefit Rate per Hour: $50.01

Supplemental Note: $92.62 on overtime
Shift Wage Rate: $108.00

Engineer - Heavy Construction Service Mechanic

Shovels: Cranes: Draglines: Backhoes: Keystones: Pavers: Trenching Machines: Gunite Machines: Compressors (three (3) or more in Battery): Crawler Cranes- having a straight lattice boom with no attachment or luffing boom, no jib and no auxiliary attachment.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $45.09
Supplemental Benefit Rate per Hour: $50.01
Supplemental Note: $92.62 on overtime
Shift Wage Rate: $72.14

Engineer - Steel Erection Maintenance Engineers

Derrick, Travelers, Tower, Crawler Tower and Climbing Cranes

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $72.71
Supplemental Benefit Rate per Hour: $50.01
Supplemental Note: $92.62 on overtime
Shift Wage Rate: $116.34

Engineer - Steel Erection Oiler I

On a Truck Crane

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $67.75
Supplemental Benefit Rate per Hour: $50.01
Supplemental Note: $92.62 on overtime
Shift Wage Rate: $108.40

Engineer - Steel Erection Oiler II

On a Crawler Crane

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $47.58
Supplemental Benefit Rate per Hour: $50.01
Supplemental Note: $92.62 on overtime
Shift Wage Rate: $76.13

Overtime Description

On jobs of more than one shift, if the next shift employee fails to report for work through any cause over which the employer has no control, the employee on duty who works the next shift continues to work at the single time rate.

Overtime

Double time the regular rate after an 8 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.
Double time the regular rate for work on the following holiday(s).

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Engineer - Building Work Maintenance Engineers I

Installing, repairing, maintaining, dismantling (of all equipment including: Steel Cutting and Bending Machines, Mechanical Heaters, Mine Hoists, Climbing Cranes, Tower Cranes, Linden Peine, Lorain, Liebherr, Mannes, or machines of a similar nature, Well Point Systems, Deep Well Pumps, Concrete Mixers with loading Device, Concrete Plants, Motor Generators when used for temporary power and lights), skid steer machines of a similar nature including bobcat.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $62.18
Supplemental Benefit Rate per Hour: $49.01
Supplemental Note: $90.80 on overtime

Engineer - Building Work Maintenance Engineers II

On Pumps, Generators, Mixers and Heaters

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $47.13
Supplemental Benefit Rate per Hour: $49.01
Supplemental Note: $90.80 on overtime

Engineer - Building Work Oilers I

All gasoline, electric, diesel or air operated Gradealls: Concrete Pumps, Overhead Cranes in Power Houses: Their duties shall be to assist the Engineer in oiling, greasing and repairing of all machines; Driving Truck

Cranes: Driving and Operating Fuel and Grease Trucks, Cherrypickers (hydraulic cranes) over 70,000 GVW, and machines of a similar nature.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $58.86
Supplemental Benefit Rate per Hour: $49.01
Supplemental Note: $90.80 on overtime

Engineer - Building Work Oilers II

Oilers on Crawler Cranes, Backhoes, Trenching Machines, Gunite Machines, Compressors (three or more in Battery).

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $42.39
Supplemental Benefit Rate per Hour: $49.01
Supplemental Note: $90.80 on overtime

Overtime Description
On jobs of more than one shift, if an Employee fails to report for work through any cause over which the Employer has no control, the Employee on duty will continue to work at the rate of single time.

Overtime
Double time the regular rate after an 8 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.
Double time the regular rate for work on the following holiday(s).

Paid Holidays
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day

Shift Rates
When two (2) or more shifts are employed, single time will be paid for each shift.

(Local #15)

ENGINEER - CITY SURVEYOR AND CONSULTANT

Party Chief

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $46.32
Supplemental Benefit Rate per Hour: $29.32
Supplemental Note: Overtime Benefit Rate - $35.01 per hour (time & one half) $40.69 per hour (double time).

Instrument Person

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $37.60
Supplemental Benefit Rate per Hour: $29.32
Supplemental Note: Overtime Benefit Rate - $35.01 per hour (time & one half) $40.69 per hour (double time).

Rodperson

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $32.08
Supplemental Benefit Rate per Hour: $29.32
Supplemental Note: Overtime Benefit Rate - $35.01 per hour (time & one half) $40.69 per hour (double time).

Rodperson 1st Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $25.00
Supplemental Benefit Rate per Hour: $29.32
Supplemental Note: Overtime Benefit Rate - $35.01 per hour (time & one half) $40.69per hour (double time).

Overtime Description

Time and one half the regular rate after an 8 hour day, Time and one half the regular rate for Saturday for the first eight hours worked, Double time the regular time rate for Saturday for work performed in excess of eight hours, Double time the regular rate for Sunday and Double time the regular rate for work on a holiday.

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

(Operating Engineer Local #15-D)

ENGINEER - FIELD (BUILDING CONSTRUCTION)

(Construction of Building Projects, Concrete Superstructures, etc.)

Field Engineer - BC Party Chief

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $70.53
Supplemental Benefit Rate per Hour: $44.03
Supplemental Note: Overtime Benefit Rate - $62.35 per hour (time & one half) $80.66 per hour (double time).

Field Engineer - BC Instrument Person

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $50.03
Supplemental Benefit Rate per Hour: $44.03
Supplemental Note: Overtime Benefit Rate - $62.35 per hour (time & one half) $80.66 per hour (double time).

Field Engineer - BC Rodperson

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $30.96
Supplemental Benefit Rate per Hour: $44.03
Supplemental Note: Overtime Benefit Rate - $62.35 per hour (time & one half) $80.66 per hour (double time).

Overtime Description

Time and one half the regular rate after a 7 hour work and time and one half the regular rate for Saturday for the first seven hours worked, Double time the regular time rate for Saturday for work performed in excess of seven hours, Double time the regular rate for Sunday and Double time the regular rate for work on a holiday.

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

(Operating Engineer Local #15-D)

ENGINEER - FIELD (HEAVY CONSTRUCTION)

(Construction of Roads, Tunnels, Bridges, Sewers, Building Foundations, Engineering Structures etc.)

Field Engineer - HC Party Chief

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $79.60
Supplemental Benefit Rate per Hour: $49.02
Supplemental Note: Overtime benefit rate - $69.71 per hour (time & one half), $90.40 per hour (double time).

Field Engineer - HC Instrument Person

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $56.67
Supplemental Benefit Rate per Hour: $49.02
Supplemental Note: Overtime benefit rate - $69.71 per hour (time & one half), $90.40 per hour (double time).

Field Engineer - HC Rodperson

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $46.48
Supplemental Benefit Rate per Hour: $49.02
Supplemental Note: Overtime benefit rate - $69.71 per hour (time & one half), $90.40 per hour (double time).

Field Engineer - HC Rodperson 1st Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $25.00
Supplemental Benefit Rate per Hour: $49.02
Supplemental Note: Overtime benefit rate - $69.71 per hour (time & one half), $90.40 per hour (double time).

Overtime Description

Time and one half the regular rate after an 8 hour day, Time and one half the regular rate for Saturday for the first eight hours worked, Double time the regular time rate for Saturday for work performed in excess of eight hours, Double time the regular rate for Sunday and Double time the regular rate for work on a holiday.

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

(Operating Engineer Local #15-D)

ENGINEER - FIELD (STEEL ERECTION)

Field Engineer - Steel Erection Party Chief

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $75.53
Supplemental Benefit Rate per Hour: $47.36
Supplemental Note: Overtime benefit rate - $67.22 per hour (time & one half), $87.07 per hour (double time).

Field Engineer - Steel Erection Instrument Person

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $54.68
Supplemental Benefit Rate per Hour: $47.36
Supplemental Note: Overtime benefit rate - $67.22 per hour (time & one half), $87.07 per hour (double time).

Field Engineer - Steel Erection Rodperson

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $34.80
Supplemental Benefit Rate per Hour: $47.36
Supplemental Note: Overtime benefit rate - $67.22 per hour (time & one half), $87.07 per hour (double time).

Field Engineer - Steel Erection Rodperson 1st Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $25.00
Supplemental Benefit Rate per Hour: $47.36

Supplemental Note: Overtime benefit rate - $67.22 per hour (time & one half), $87.07 per hour (double time).

Overtime Description

Time and one half the regular rate for Saturday for the first eight hours worked.
Double time the regular rate for Saturday for work performed in excess of eight hours.

Overtime

Time and one half the regular rate after an 8 hour day.
Double time the regular rate for Sunday.
Double time the regular rate for work on the following holiday(s).

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Employees must work at least one (1) day in the payroll week in which the holiday occurs to receive the paid holiday

(Operating Engineer Local #15-D)

ENGINEER - OPERATING

Operating Engineer - Road & Heavy Construction I

Back Filling Machines, Cranes, Mucking Machines and Dual Drum Paver.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $93.74
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $149.98

Operating Engineer - Road & Heavy Construction II

Backhoes, Power Shovels, Hydraulic Clam Shells, Steel Erection, Moles and machines of a similar nature.

Effective Period: 7/1/2025 - 6/30/2026

Wage Rate per Hour: $97.06
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $155.30

Operating Engineer - Road & Heavy Construction III

Mine Hoists (Cranes, etc. when used as Mine Hoists)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $100.18
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $160.29

Operating Engineer - Road & Heavy Construction IV

Gradealls, Keystones, Cranes on land or water (with digging buckets), Bridge Cranes, Vermeer Cutter and machines of a similar nature, Trenching Machines.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $97.75
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $156.40

Operating Engineer - Road & Heavy Construction V

Pile Drivers & Rigs (working alongside Dock Builder foreperson): Derrick Boats, Tunnel Shovels.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $95.83
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $153.33

Operating Engineer - Road & Heavy Construction VI

Mixers (Concrete with loading attachment), Concrete Pavers, Cableways, Land Derricks, Power Houses (Low Air Pressure Units).

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $91.04
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $145.66

Operating Engineer - Road & Heavy Construction VII

Barrier Movers, Barrier Transport and Machines of a Similar Nature.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $73.56
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $117.70

Operating Engineer - Road & Heavy Construction VIII

Utility Compressors

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $57.14
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $71.98

Operating Engineer - Road & Heavy Construction IX

Horizontal Boring Rig

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $86.61
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $138.58

Operating Engineer - Road & Heavy Construction X

Elevators (manually operated as personnel hoist).

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $79.62
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $127.39

Operating Engineer - Road & Heavy Construction XI

Compressors (Portable 3 or more in battery), Driving of Truck Mounted Compressors, Well-point Pumps, Tugger Machines Well Point Pumps, Churn Drill.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $61.87
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours

Shift Wage Rate: $98.99

Operating Engineer - Road & Heavy Construction XII

All Drills and Machines of a similar nature.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $92.01
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $147.22

Operating Engineer - Road & Heavy Construction XIII

Concrete Pumps, Concrete Plant, Stone Crushers, Double Drum Hoist, Power Houses (other than above).

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $89.14
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $142.62

Operating Engineer - Road & Heavy Construction XIV

Concrete Mixer

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $85.21
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $136.34

Operating Engineer - Road & Heavy Construction XV

Compressors (Portable Single or two in Battery, not over 100 feet apart), Pumps (River Cofferdam) and Welding Machines, Push Button Machines, All Engines Irrespective of Power (Power-Pac) used to drive auxiliary equipment, Air, Hydraulic, etc.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $57.52
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $92.03

Operating Engineer - Road & Heavy Construction XVI

Concrete Breaking Machines, Hoists (Single Drum), Load Masters, Locomotives (over ten tons) and Dinkies over ten tons, Hydraulic Crane-Second Engineer.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $81.38
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $130.21

Operating Engineer - Road & Heavy Construction XVII

On-Site concrete plant engineer, On-site Asphalt Plant Engineer, and Vibratory console.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $81.97
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $131.15

Operating Engineer - Road & Heavy Construction XVIII

Tower Crane

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $117.60
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $188.16

Operating Engineer - Paving I

Asphalt Spreaders, Autograde (C.M.I.), Roto/Mil

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $91.04
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $145.66

Operating Engineer - Paving II

Asphalt Roller

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $88.72
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $141.95

Operating Engineer - Paving III

Asphalt Plants

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $75.01
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $120.02

Operating Engineer - Concrete I

Cranes

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $97.32
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours

Operating Engineer - Concrete II

Compressors

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $57.96
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours

Operating Engineer - Concrete III

Micro-traps (Negative Air Machines), Vac-All Remediation System.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $77.80
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours

Operating Engineer - Steel Erection I

Three Drum Derricks

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $101.49
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $162.38

Operating Engineer - Steel Erection II

Cranes, 2 Drum Derricks, Hydraulic Cranes, Fork Lifts and Boom Trucks.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $97.52
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $156.03

Operating Engineer - Steel Erection III

Compressors, Welding Machines.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $55.28
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $88.45

Operating Engineer - Steel Erection IV

Compressors - Not Combined with Welding Machine. (Public Works Only)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $52.63
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
Shift Wage Rate: $84.21

Operating Engineer - Building Work I

Forklifts, Plaster (Platform machine), Plaster Bucket, Concrete Pump and all other equipment used for hoisting material.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $72.46
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours

Operating Engineer - Building Work II

Compressors, Welding Machines (Cutting Concrete-Tank Work), Paint Spraying, Sandblasting, Pumps (with the exclusion of Concrete Pumps), All Engines irrespective of Power (Power-Pac) used to drive Auxiliary Equipment, Air, Hydraulic, Jacking System, etc.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $54.12
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours

Operating Engineer - Building Work III

Double Drum

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $92.32
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours

Operating Engineer - Building Work IV

Stone Derrick, Cranes, Hydraulic Cranes Boom Trucks.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $97.79
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours

Operating Engineer - Building Work V

Dismantling and Erection of Cranes, Relief Engineer.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $80.56
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours

Operating Engineer - Building Work VI

4 Pole Hoist, Single Drum Hoists.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $79.70
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours

Operating Engineer - Building Work VII

Rack & Pinion and House Cars

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $63.27
Supplemental Benefit Rate per Hour: $38.90
Supplemental Note: $71.50 overtime hours
For New House Car projects Wage Rate per Hour $50.39
For New House Car projects: Supplemental Benefit overtime hours: $71.50

Overtime Description

On jobs of more than one shift, if an Employee fails to report for work through any cause over which the Employer has no control, the Employee on duty will continue to work at the rate of single time.

For House Cars and Rack & Pinion only: Overtime paid at time and one-half for all hours in excess of eight hours in a day, Saturday, Sunday and Holidays worked.

Overtime

Double time the regular rate after an 8 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.
Double time the regular rate for work on the following holiday(s).

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates

When two (2) or more shifts are employed, single time will be paid for each shift.
For Steel Erection Only: Shifts may be worked at the single time rate at other than the regular working hours (8:00 A.M. to 4:30 P.M.) on the following work ONLY: Heavy construction jobs on work below the street level, over railroad tracks and on building jobs.

(Operating Engineer Local #14)

FLAGGER

Flagger to be paid at the rate of the journeyperson or apprentice in the trade performing the underlying work.

In accordance with the Comptroller's Prevailing Wage Memorandum Regarding Flag Persons dated June 1, 2024, this title includes traffic control duty only for City public works contracts and subcontracts solicited on or after July 1, 2024.

On City public works contracts and subcontracts solicited on or after July 1, 2024, traffic control worker to be paid at the rate of the journeyperson or apprentice in the trade performing the underlying work.

If the trade performing the underlying work does not regularly employ a flagger or traffic control worker, then one of the following titles must be used on such projects:
Laborer - Heavy & Highway
Laborer - Paver & Roadbuilder
Laborer - Paver & Roadbuilder Line Striping (Roadway)

FLOOR COVERER

(Interior vinyl composition tile, sheath vinyl linoleum and wood parquet tile including site preparation and synthetic turf not including site preparation)

Floor Coverer

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $59.05
Supplemental Benefit Rate per Hour: $49.08

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Day after Thanksgiving

Day before Christmas
Christmas Day
Day before New Year's Day

Shift Rates

Two shifts may be utilized with the first shift working 8 a.m. to the end of the shift at straight time rate of pay. The wage rate for the second shift consisting of 7 hours shall be paid at 114.29% of straight time wage rate. The wage rate for the second shift consisting of 8 hours shall be paid 112.5% of the straight time wage rate. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, the rule for the second shift will apply.

(Carpenters District Council)

GLAZIER

(New Construction, Remodeling, and Alteration)

Glazier

Effective Period: 7/1/2025 - 10/31/2025
Wage Rate per Hour: $49.20
Supplemental Benefit Rate per Hour: $57.22

Effective Period: 11/1/2025 - 6/30/2026
Wage Rate per Hour: $49.45
Supplemental Benefit Rate per Hour: $58.62

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays

None

(Local #1281)

GLAZIER - REPAIR & MAINTENANCE

(For the Installation of Glass - All repair and maintenance work on a particular building.)

Craft Jurisdiction for repair, maintenance and fabrication

Plate glass replacement, Storm windows and storm doors, Herculite door repairs, Door closer repairs, Glass tinting.

Effective Period: 7/1/2025 - 10/31/2025
Wage Rate per Hour: $27.69
Supplemental Benefit Rate per Hour: $28.43

Effective Period: 11/1/2025 - 6/30/2026
Wage Rate per Hour: $28.32
Supplemental Benefit Rate per Hour: $28.68

Overtime

Time and one half the regular rate after an 8 hour day.
Double time the regular rate for Sunday.
Time and one half the regular rate for work on the following holiday(s).
Time and one half the regular hourly rate after 40 straight time hours in any work week.

Paid Holidays

New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

(Local #1281)

HAZARDOUS MATERIAL HANDLER

(Removal, abatement, encapsulation or decontamination of asbestos, lead, mold, or other toxic or hazardous waste/materials)

Handler

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $39.95
Supplemental Benefit Rate per Hour: $23.76

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Sunday.
Time and one half the regular hourly rate after 40 straight time hours in any work week.

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day
Easter

Paid Holidays

None

(Local #78 and Local #12A)

HEAT AND FROST INSULATOR

Heat & Frost Insulator

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $71.71
Supplemental Benefit Rate per Hour: $36.81

Overtime Description

Supplemental Benefit contributions are to be made at the applicable overtime rates.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Triple time the regular rate for work on the following holiday(s).
Labor Day

Paid Holidays

None

Shift Rates

The first shift shall work seven hours at the regular straight time rate. The second and third shift shall work seven hours the regular straight time hourly rate plus a fourteen percent wage and benefit premium. There must be a first shift to work the second shift, and a second shift to work the third shift. Off-hour jobs in occupied buildings may be worked on weekdays with an increment of one-dollar ($1.00) per hour and eight (8) hours pay for seven (7) hours worked.

(Local #12) (BCA)

HOUSE WRECKER
(TOTAL DEMOLITION)

House Wrecker - Tier A

On all work sites the first, second, eleventh and every third House Wrecker thereafter will be Tier A House Wreckers (i.e. 1st, 2nd, 11th, 14th etc). Other House Wreckers may be Tier B House Wreckers.

Effective Period: 7/1/2025 - 6/30/2026

Wage Rate per Hour: $40.00
Supplemental Benefit Rate per Hour: $32.40

House Wrecker - Tier B

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $29.23
Supplemental Benefit Rate per Hour: $24.81

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

(Mason Tenders District Council)

IRON WORKER - ORNAMENTAL

Iron Worker - Ornamental

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $48.15
Supplemental Benefit Rate per Hour: $67.62
Supplemental Note: Supplemental benefits are to be paid at the applicable overtime rate when overtime is in effect.

Overtime Description
Monday through Friday- the first eight hours are paid at straight time, the 9th and 10th hours are paid at time and one-half the regular rate, all additional weekday overtime is paid at double the regular rate. Saturdays- the first eight hours are paid at time and one-half the regular rate, double time thereafter. Sunday-all shifts are paid at double time. Four Days a week at Ten (10) hours straight time is allowed.

Overtime
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
When two or three shifts are employed on a job, Monday through Friday, each shift will be paid eight (8) hours at the straight time rate for eight (8) hours of work; at time and one-half the regular straight time rate for the first two (2) hours of overtime worked beyond eight (8) hours; and at double time for all work thereafter. When it is not possible to conduct alteration or repair work during regular working hours in a building occupied by tenants, eight (8) hours will be paid at straight time rate for seven (7) hours of work, and all overtime shall be paid at time and one-half the regular straight time rates. On Saturday, Sundays and Holidays, time and one-half the regular straight time rate shall be paid for all work up to seven (7) hours and double time shall be paid for all work thereafter.

(Local #580)

IRON WORKER - STRUCTURAL

Iron Worker - Structural

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $58.95
Supplemental Benefit Rate per Hour: $92.02
Supplemental Note: Supplemental benefits are to be paid at the applicable overtime rate when overtime is in effect.

Overtime Description
Monday through Friday- the first eight hours are paid at straight time, the 9th and 10th hours are paid at time and one-half the regular rate, all additional weekday overtime is paid at double the regular rate. Saturdays- the first eight hours are paid at time and one-half the regular rate, double time thereafter. Sunday-all shifts are paid at double time. Four Days a week at Ten (10) hours straight time is allowed.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays

1/2 day on Christmas Eve if work is performed in the A.M.
1/2 day on New Year's Eve if work is performed in the A.M.

Shift Rates

Monday through Friday - First Shift: First eight hours are paid at straight time, the 9th & 10th hours are paid at time and a half, double time paid thereafter. Second and third Shifts: First eight hours are paid at time and one-half, double time thereafter. Saturdays: All shifts, first eight hours paid at time and one-half, double time thereafter: Sunday all shifts are paid at double time.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday.

(Local #40 & #361)

LABORER – HEAVY & HIGHWAY

(Foundation, Concrete, Excavating, Street Pipe Layer and Common)

Laborer - Heavy & Highway

Excavation and foundation work for buildings, heavy construction, street pipe laying, engineering work, and hazardous waste removal in connection with the above work. Landscaping tasks in connection with heavy construction work, engineering work and building projects. Projects include, but are not limited to pollution plants, sewers, parks, subways, bridges, highways, etc. In accordance with the Comptroller's Prevailing Wage Memorandum Regarding Flag Persons dated June 1, 2024, for City public work contracts and subcontracts solicited on or after July 1, 2024 only, includes traffic control duty associated with such projects.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $45.60
Supplemental Benefit Rate per Hour: $55.73

Overtime Description
Paid Holidays: Labor Day, Thanksgiving Day
No Supplemental Benefits are paid for non-worked holidays.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Thanksgiving Day
Christmas Day

Shift Rates
When two shifts are employed, single time rate shall be paid for each shift. When three shifts are found necessary, each shift shall work seven and one half hours (7 ½), but shall be paid for eight (8) hours of labor, and be permitted one half hour for lunch.

(Local #731)

LABORER - PAVER & ROADBUILDER

Laborer - Paver & Roadbuilder

Paving and road construction work, regardless of material used, including but not limited to preparation of job sites, removal of old surfaces, asphalt and/or concrete, by whatever method, including but not limited to milling; laying of concrete; laying of asphalt for temporary, patchwork, and utility paving (but not production paving); site preparation and incidental work for installation of rubberized materials and similar surfaces; installation and repair of temporary construction fencing; slurry/seal coating, paving stones, maintenance of safety surfaces; play equipment installation, and other related work. In accordance with the Comptroller's Prevailing Wage Memorandum Regarding Flag Persons dated June 1, 2024, for City public work contracts and subcontracts solicited on or after July 1, 2024 only, includes traffic control duty associated with such projects.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $46.33
Supplemental Benefit Rate per Hour: $55.00
Supplemental Note: For time and one half overtime - $59.63 For double overtime - $64.25

Paver & Roadbuilder - Formsetter

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $50.20
Supplemental Benefit Rate per Hour: $55.00
Supplemental Note: For time and one half overtime - $59.63 For double overtime - $64.25

Production Paver & Roadbuilder - Shoveler

General laborer (except removal of surfaces - see Paver and Roadbuilder-Laborer) including but not limited to tamper, AC paint and liquid tar work.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $46.33
Supplemental Benefit Rate per Hour: $55.00
Supplemental Note: For time and one half overtime - $59.63 For double overtime - $64.25

Production Paver & Roadbuilder - Raker

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $50.20
Supplemental Benefit Rate per Hour: $55.00
Supplemental Note: For time and one half overtime - $59.63 For double overtime - $64.25

Production Paver & Roadbuilder - Screed Person

(Production paving is asphalt paving when using a paving machine or on a project where a paving machine is traditionally used)

Adjustment of paving machinery on production paving jobs.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $50.80
Supplemental Benefit Rate per Hour: $55.00
Supplemental Note: For time and one half overtime - $59.63 For double overtime - $64.25

Overtime Description

If an employee works New Year's Day or Christmas Day, they receive the single time rate plus 25%.

For Paid Holidays: Holiday pay for all holidays shall be prorated based two hours per day for each day worked in the holiday week, not to exceed 8 hours of holiday pay.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).

Memorial Day
Independence Day
Labor Day
Columbus Day
Thanksgiving Day

Paid Holidays

Memorial Day
Independence Day
Labor Day
Thanksgiving Day

Shift Rates

When two shifts are employed, the work period for each shift shall be a continuous eight (8) hours. When three shifts are employed, each shift will work seven and one half (7 ½) hours but will be paid for eight (8) hours at the straight time rate since only one half (1/2) hour is allowed for meal time.
When two or more shifts are employed, single time will be paid for each shift.

(Local #1010)

LABORER - PAVER & ROADBUILDER LINE STRIPING (ROADWAY)

(Road markings, applications of striping and surface coatings on Roadways, Bus lanes, Bike lanes & Pedestrian Plazas)

Striping - Machine Operator (Thermoplastic & Epoxy)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $42.00
Supplemental Benefit Rate per Hour: $21.17
Supplemental Note: For time and one half overtime - $22.87 For double overtime - $24.57

Lineperson - Crew Chief

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $46.00
Supplemental Benefit Rate per Hour: $21.17
Supplemental Note: For time and one half overtime - $22.87 For double overtime - $24.57

Laborer: Striping Assistant - Green Infrastructure - Traffic Control

In accordance with the Comptroller's Prevailing Wage Memorandum Regarding Flag Persons dated June 1, 2024, for City public work contracts and subcontracts solicited on or after July 1, 2024 only, includes traffic control duty associated with such projects.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $40.00
Supplemental Benefit Rate per Hour: $21.17
Supplemental Note: For time and one half overtime - $22.87 For double overtime - $24.57

Overtime Description

For Paid Holidays: Employees will only receive Holiday Pay for holidays not worked if said employee worked both the regularly scheduled workday before and after the holiday.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.
Time and one half the regular rate for work on the following holiday(s).

Paid Holidays

New Year's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Vacation

Vacation Employees with one to two years service shall accrue vacation based on hours worked: 250 hours worked - 1 day vacation; 500 hours worked - 2 days vacation; 750 hours worked - 3 days vacation; 900 hours worked - 4 days vacation; 1,000 hours worked - 5 days vacation. Employees with two to five years service receive two weeks vacation. Employees with five to twenty years service receive three weeks vacation. Employees with twenty to twenty-five years service receive four weeks vacation. Employees with 25 or more years service receive five weeks vacation.

(Local #1010)

LANDSCAPING

(Landscaping tasks, such as tree pruning, tree removing and spraying in connection with Green Infrastructure maintenance and the planting of street trees and trees in City parks, but not when such activities are performed as part of construction or reconstruction projects.)

Landscaper (Year 6 and above)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $38.94
Supplemental Benefit Rate per Hour: $18.55

Landscaper (Year 3 - 5)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $37.70
Supplemental Benefit Rate per Hour: $18.55

Landscaper (up to 3 years)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $34.60
Supplemental Benefit Rate per Hour: $18.55

Groundperson

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $34.60
Supplemental Benefit Rate per Hour: $18.55

Tree Remover / Pruner

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $45.17
Supplemental Benefit Rate per Hour: $18.55

Landscaper Sprayer (Pesticide Applicator)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $32.74
Supplemental Benefit Rate per Hour: $18.55

Watering - Plant Maintainer

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $26.50
Supplemental Benefit Rate per Hour: $18.55

Overtime Description

For all overtime work performed, supplemental benefits shall include an additional seventy-five ($0.75) cents per hour.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Time and one half the regular rate for work on a holiday plus the day's pay.

Paid Holidays

New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Shift Rates

Work performed on a 4pm to 12am shift has a 15% differential. Work performed on a 12am to 8am shift has a 20% differential.

(Local #175)

MARBLE MECHANIC

Marble Setter

Effective Period: 7/1/2025 - 7/6/2025
Wage Rate per Hour: $59.21
Supplemental Benefit Rate per Hour: $44.46

Effective Period: 7/7/2025 - 6/30/2026
Wage Rate per Hour: $59.66
Supplemental Benefit Rate per Hour: $44.76

Marble Finisher

Effective Period: 7/1/2025 - 7/6/2025
Wage Rate per Hour: $45.67
Supplemental Benefit Rate per Hour: $41.36

Effective Period: 7/7/2025 - 6/30/2026
Wage Rate per Hour: $45.89
Supplemental Benefit Rate per Hour: $41.66

Marble Polisher

Effective Period: 7/1/2025 - 7/6/2025
Wage Rate per Hour: $44.68
Supplemental Benefit Rate per Hour: $34.31

Effective Period: 7/7/2025 - 6/30/2026
Wage Rate per Hour: $44.95
Supplemental Benefit Rate per Hour: $34.61

Marble Maintenance Finisher

Effective Period: 7/1/2025 - 7/6/2025
Wage Rate per Hour: $27.99
Supplemental Benefit Rate per Hour: $15.44

Effective Period: 7/7/2025 - 6/30/2026
Wage Rate per Hour: $28.15
Supplemental Benefit Rate per Hour: $15.69

Overtime Description
Supplemental Benefit contributions are to be made at the applicable overtime rates.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

(Local #7)

MASON TENDER
Building Laborer

Mason Tender

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $41.80
Supplemental Benefit Rate per Hour: $34.14

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
The employer may work two (2) shifts with the first shift at the straight time wage rate and the second shift receiving eight (8) hours paid for seven (7) hours work at the straight time wage rate. When it is not possible to conduct alteration work during regular working hours in a building occupied by tenants, the rule for the second shift will apply

(Local #79)

MASON TENDER (INTERIOR DEMOLITION WORKER)

Mason Tender Tier A

Tier A Interior Demolition Worker performs all burning, chopping, and other technically skilled tasks related to interior demolition work.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $38.40
Supplemental Benefit Rate per Hour: $26.89

Mason Tender Tier B

Tier B Interior Demolition Worker performs manual work and work incidental to demolition work, such as loading and carting of debris from the work site to an area where it can be loaded in to bins/trucks for removal.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $27.59
Supplemental Benefit Rate per Hour: $21.21

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

(Local #79)

METALLIC LATHER

Metallic Lather

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $46.50
Supplemental Benefit Rate per Hour: $56.46
Supplemental Note: For time and one half overtime - $68.21 For double overtime - $89.86

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Thanksgiving Day
Christmas Day

Paid Holidays
1/2 day on Christmas Eve if work is performed in the A.M.
1/2 day on New Year's Eve if work is performed in the A.M.

Shift Rates
Off-shift work outside of normal working hours shall receive straight time rate plus $12 per hour for the first eight (8) hours.

(Local #46)

MILLWRIGHT

Millwright

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $60.83
Supplemental Benefit Rate per Hour: $59.18

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day

Independence Day
Labor Day
Columbus Day
Presidential Election Day
Veteran's Day
Thanksgiving Day
Christmas Day

Paid Holidays

1/2 day on Christmas Eve if work is performed in the A.M.
1/2 day on New Year's Eve if work is performed in the A.M.

Shift Rates

Second and third shifts receives the straight time rate of pay plus fifteen (15%) percent allowing for one half hour for a meal. There must be a first shift to work a second and third shift. All additional hours worked shall be paid at the time and one-half rate of pay plus fifteen (15%) percent for weekday hours.

(Local #740)

MOSAIC MECHANIC

Mosaic Mechanic - Mosaic & Terrazzo Mechanic

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $54.77
Supplemental Benefit Rate per Hour: $48.42

Mosaic Mechanic - Mosaic & Terrazzo Finisher

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $53.17
Supplemental Benefit Rate per Hour: $48.42

Mosaic Mechanic - Machine Operator Grinder

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $53.17
Supplemental Benefit Rate per Hour: $48.42

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays

None

(Local #7)

PAINTER

Painter - Brush & Roller

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $44.75
Supplemental Benefit Rate per Hour: $44.13
Supplemental Note: $52.76 on overtime

Spray & Scaffold / Decorative / Sandblast

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $47.75
Supplemental Benefit Rate per Hour: $44.13
Supplemental Note: $52.76 on overtime

Overtime

Time and one half the regular rate after a 7 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day

Independence Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

(District Council of Painters #9)

PAINTER - BRIDGE & STRUCTURAL STEEL

Painters on Structural Steel

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $56.25
Supplemental Benefit Rate per Hour: $55.09

Painter - Power Tool

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $64.70
Supplemental Benefit Rate per Hour: $55.09
Overtime Wage Rate: $7.00 above the "Painters on Structural Steel" overtime rate.

Overtime Description
Supplemental Benefits shall be paid for each hour worked, up to forty (40) hours per week for the period of May 1st to November 15th or up to fifty (50) hours per week for the period of November 16th to April 30th.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
Second shift is paid at regular hourly wage rates plus a ten percent (10%) differential. There must be a first shift to work a second shift.

(Local #806)

PAINTER - METAL POLISHER

METAL POLISHER

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $35.00
Supplemental Benefit Rate per Hour: $12.84

METAL POLISHER - NEW CONSTRUCTION

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $35.95
Supplemental Benefit Rate per Hour: $12.84

METAL POLISHER - SCAFFOLD OVER 34 FEET

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $38.50
Supplemental Benefit Rate per Hour: $12.84

ASSISTANT METAL POLISHER

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $27.19
Supplemental Benefit Rate per Hour: $12.47

ASSISTANT METAL POLISHER - NEW CONSTRUCTION

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $27.94
Supplemental Benefit Rate per Hour: $12.47

ASSISTANT METAL POLISHER - SCAFFOLD OVER 34 FEET

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $29.69
Supplemental Benefit Rate per Hour: $12.47

Overtime Description
All work performed on Saturdays shall be paid at time-in-a half. The exception being; for suspended scaffold work and work deemed as a construction project; an eight (8) hour shift lost during the week due to circumstances beyond the control of the employer, up to a maximum of eight (8) hours per week, may be worked on Saturday at the straight time rate.

Holiday Pay
Double time the regular rate for work on the following Holiday plus the day's pay. Only employees who have completed one year of service, including any trial period shall be eligible for holiday pay.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Paid Holidays
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates
Four Days a week at Ten (10) hours straight a day.

Local 8A-28A

PAINTER - SIGN

Sign Painter

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $49.39
Supplemental Benefit Rate per Hour: $29.75

Assistant Sign Painter

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $41.98
Supplemental Benefit Rate per Hour: $29.04

Overtime Description

If any employee is required to work on any of the paid holidays then the employee shall receive double time rate of wages as well as the holiday pay for that day.

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Paid Holidays

New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day
Personal Day

Vacation

At least 1 year of employment.....1 week
2 years or more of employment.....2 weeks
8 years or more of employment.....3 weeks

(Local #8A-28A)

PAPERHANGER

Paperhanger

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $48.02

Supplemental Benefit Rate per Hour: $45.56
Supplemental Note: Supplemental benefits are to be paid at the appropriate straight time and overtime rate.

Overtime
Time and one half the regular rate after a 7 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
Evening shift - 4:30 P.M. to 12:00 Midnight (regular rate of pay); any work performed before 7:00 A.M. shall be at time and one half the regular base rate of pay.

(District Council of Painters #9)

PLASTERER

Plasterer

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $52.99
Supplemental Benefit Rate per Hour: $26.10

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
When it is not possible to conduct work during regular working hours (between 6:30am and 4:30pm), a shift differential shall be paid at the regular hourly rate plus a twelve percent (12%) per hour differential. Workers on shift work shall be allowed a paid one-half hour meal break.

(Local #262)

PLASTERER - TENDER

Plasterer - Tender

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $41.80
Supplemental Benefit Rate per Hour: $34.14

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Washington's Birthday
Memorial Day
Independence Day
Labor Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
When work commences outside regular work hours, workers receive an hour additional (differential) wage and supplement payment. Eight hours pay for seven hours work or nine hours pay for eight hours work.

(Mason Tenders District Council)

PLUMBER

Plumber

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $76.30
Supplemental Benefit Rate per Hour: $45.15
Supplemental Note: Double time shall be paid for supplemental benefits during overtime work.

Plumber - Temporary Services

Temporary Services - When there are no Plumbers on the job site, there may be three shifts designed to cover the entire twenty-four hour period, including weekends if necessary, at the following rate straight time.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $61.12
Supplemental Benefit Rate per Hour: $36.04
Supplemental Note: Double time shall be paid for supplemental benefits during overtime work.

Overtime Description
Where the plumbing contract price is one and one half million dollars ($1,500,000.00) or less, double time the regular rate after an 8 hour day.

Overtime
Double time the regular rate after a 7 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day

Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates

Shift work, when directly specified in public agency or authority contract documents, and continues for a period of not less than ten (10) consecutive work days. A shift shall consist of seven (7) hours with one-half (1/2) hour for lunch after the first four (4) hours of each shift. A premium of thirty percent (30%) for wages and supplemental benefits on shift work performed Monday through Friday on the 4 P.M. and midnight shifts. For shift work performed on weekends the shift premium shall be fifty percent (50%) of wages and supplemental benefits. For shift work performed on holidays designated below, double time wages and supplemental benefits shall be paid. Also noted that the normal workday Monday through Friday 8:00 A.M. to 3:30 P.M. is not considered shift work, and therefore not subject to shift premium.

(Plumbers Local #1)

PLUMBER (MECHNICAL EQUIPMENT AND SERVICE)

Mechanical Equipment and Service work is any repair and/or replacement of the present plumbing system that does not change existing roughing or water supply lines. Projects regardless of work type which have approved plans and specifications wherein the plumbing exceeds $725,000 are excluded.

Plumber

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $48.90
Supplemental Benefit Rate per Hour: $22.26

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Thanksgiving Day
Day after Thanksgiving

Christmas Day

Paid Holidays
None

(Plumbers Local # 1)

PLUMBER (RESIDENTIAL RATES FOR 1, 2 AND 3 FAMILY HOME CONSTRUCTION)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $53.02
Supplemental Benefit Rate per Hour: $32.33

Overtime
Double time the regular rate after an 8 hour day.
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
Shift work, when directly specified in public agency or authority contract documents, and continues for a period of not less than ten (10) consecutive work days. A shift shall consist of seven (7) hours with one-half (1/2) hour for lunch after the first four (4) hours of each shift. A premium of thirty percent (30%) for wages and supplemental benefits on shift work performed Monday through Friday on the 4 P.M. and midnight shifts. For shift work performed on weekends the shift premium shall be fifty percent (50%) of wages and supplemental benefits. For shift work performed on holidays designated below, double time wages and supplemental benefits shall be paid. Also noted that the normal workday Monday through Friday 8:00 A.M. to 3:30 P.M. is not considered shift work, and therefore not subject to shift premium.

(Plumbers Local #1)

PLUMBER: PUMP & TANK

Oil Trades (Installation and Maintenance)

Plumber - Pump & Tank

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $74.00
Supplemental Benefit Rate per Hour: $34.31

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays

None

Shift Rates

All work outside the regular workday (8:00 A.M. to 4:30 P.M.) is to be paid at time and one half the regular hourly rate

(Plumbers Local #1)

POINTER, WATERPROOFER, CAULKER, SANDBLASTER, STEAMBLASTER
(Exterior Building Renovation)

Journeyperson

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $65.33
Supplemental Benefit Rate per Hour: $32.35

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
All work outside the regular work day (an eight hour workday between the hours of 6:00 A.M. and 4:00 P.M.) is to be paid at time and one half the regular rate. However, the employer may establish one (1) or two (2) shifts starting at or after 4:00 P.M. to be paid at the regular hourly rate plus a 10% differential. For projects bid and performed after July 1, 2023, the first shift shall be paid at the regular hourly rate plus a 5% differential.

(Bricklayer District Council)

ROOFER

Roofer

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $50.25
Supplemental Benefit Rate per Hour: $39.53

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays
Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

Shift Rates
Second shift - Regular hourly rate plus a 10% differential. Third shift - Regular hourly rate plus a 15% differential. There must be a first shift to work the second shift, and a second shift to work the third shift. All other work outside the regular work day (an eight hour workday between the hours of 5:00 A.M. and 4:00 P.M.) is to be paid at time and one half the regular rate.

(Local #8)

SHEET METAL WORKER

Sheet Metal Worker

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $54.60
Supplemental Benefit Rate per Hour: $60.18
Supplemental Note: Supplemental benefit contributions are to be made at the applicable overtime rates.

Sheet Metal Worker - Fan Maintenance

(The temporary operation of fans or blowers in new or existing buildings for heating and/or ventilation, and/or air conditioning prior to the completion of the project.)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $43.68
Supplemental Benefit Rate per Hour: $60.18

Sheet Metal Worker - Duct Cleaner

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $19.84
Supplemental Benefit Rate per Hour: $13.08

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
Work that can only be performed outside regular working hours (eight hours of work between 7:30 A.M. and 3:30 P.M.) - First shift (work between 3:30 P.M. and 11:30 P.M.) - 10% differential above the established hourly rate. Second shift (work between 11:30 P.M. and 7:30 A.M.) - 15% differential above the established hourly rate.

For Fan Maintenance: On all full shifts of fan maintenance work the straight time hourly rate of pay will be paid for each shift, including nights, Saturdays, Sundays, and holidays.

(Local #28)

SHEET METAL WORKER - SPECIALTY
(Decking & Siding)

Sheet Metal Specialty Worker

The first worker to perform this work must be paid at the rate of the Sheet Metal Worker. The second and third workers shall be paid the Specialty Worker Rate. The ratio of One Sheet Metal Worker, then Two Specialty Workers shall be utilized thereafter.

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $50.50
Supplemental Benefit Rate per Hour: $31.26
Supplemental Note: Supplemental benefit contributions are to be made at the applicable overtime rates.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day

Paid Holidays
None

(Local #28)

SHIPYARD WORKER

Shipyard Mechanic - First Class

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $32.63
Supplemental Benefit Rate per Hour: $3.40

Shipyard Mechanic - Second Class

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $22.91
Supplemental Benefit Rate per Hour: $2.12

Shipyard Laborer - First Class

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $26.83
Supplemental Benefit Rate per Hour: $3.55

Shipyard Laborer - Second Class

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $19.02
Supplemental Benefit Rate per Hour: $2.68

Shipyard Dockhand - First Class

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $25.76
Supplemental Benefit Rate per Hour: $3.59

Shipyard Dockhand - Second Class

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $20.14
Supplemental Benefit Rate per Hour: $3.34

Overtime Description
Work performed on holiday is paid double time the regular hourly wage rate plus holiday pay.

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Time and one half the regular hourly rate after 40 straight time hours in any work week.

Paid Holidays
New Year's Day
Martin Luther King Jr. Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day

Day after Thanksgiving
Christmas Day

Based on Survey Data

SIGN ERECTOR
(Sheet Metal, Plastic, Electric, and Neon)

Sign Erector

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $58.00
Supplemental Benefit Rate per Hour: $63.44

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.
Time and one half the regular rate for work on the following holiday(s).

Paid Holidays
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates
Time and one half the regular hourly rate is to be paid for all hours worked outside the regular workday either (7:00 A.M. through 2:30 P.M.) or (8:00 A.M. through 3:30 P.M.)

(Local #137)

STEAMFITTER

Steamfitter

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $61.80
Supplemental Benefit Rate per Hour: $61.89
Supplemental Note: Overtime supplemental benefit rate: $123.04

Steamfitter -Temporary Services

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $46.97
Supplemental Benefit Rate per Hour: $50.22

Overtime Description
Double time after a 7 hour day except for Temporary Services.

Overtime
Double time the regular time rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
May be performed outside of the regular workday except Saturday, Sunday and Holidays. When shift work is performed the wage rate for regular time worked is a 15% percent premium on wage and 15% percent premium on supplemental benefits.

Local 638

STEAMFITTER - REFRIGERATION AND AIR CONDITIONER

(Maintenance and Installation Service Person)

Refrigeration and Air Conditioner Mechanic

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $46.10
Supplemental Benefit Rate per Hour: $21.96

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
Independence Day
Labor Day
Veteran's Day
Thanksgiving Day
Christmas Day

Double time and one half the regular rate for work on the following holiday(s).
Martin Luther King Jr. Day
President's Day
Memorial Day
Columbus Day

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day

(Local #638-B)

STONE MASON - SETTER

Stone Mason - Setter

(Assisted by Derrickperson and Rigger)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $59.47
Supplemental Benefit Rate per Hour: $56.67

Overtime Description
Monday through Friday: Time and one quarter after seven hours worked. Time and one half after eight hours worked. Double time after 9 hours worked.
Saturday: Time and one half for the first nine hours worked. Double time after 9 hours worked.
Sunday and Holiday: double time for all hours worked.
Site Work: (paving and base course) paid at straight time for the first eight hours.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Paid Holidays
1/2 day on Christmas Eve if work is performed in the A.M.

Shift Rates
For all hours worked outside 8:00 am to 3:30 pm shall be paid double time unless flex band hours and/or site work are in use.

(Bricklayers District Council)

TAPER

Drywall Taper

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $48.47
Supplemental Benefit Rate per Hour: $35.91

Overtime
Time and one half the regular rate after a 7 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Good Friday
Memorial Day
Independence Day
Columbus Day
Thanksgiving Day
Day before Christmas
Christmas Day
Day before New Year's Day

Paid Holidays
Labor Day

(Local #1974)

TELECOMMUNICATION WORKER
(Install/maintain/repair telecommunications cables carrying data, video, and/or voice except for installation on building construction/alteration/renovation projects.)

Telecommunication Worker

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $47.03
Supplemental Benefit Rate per Hour: $23.15
Supplemental Note: The above rate applies for Manhattan, Bronx, Brooklyn, Queens. $22.84 for Staten Island only.

Overtime
Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Overtime Holidays

Time and one half the regular rate for work on the following holiday(s).
New Year's Day
Lincoln's Birthday
Washington's Birthday
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Veteran's Day
Thanksgiving Day
Christmas Day

Paid Holidays

New Year's Day
Lincoln's Birthday
Washington's Birthday
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Veteran's Day
Thanksgiving Day
Christmas Day
Employees have the option of observing either Martin Luther King's Birthday or the day after Thanksgiving instead of Lincoln's Birthday

Shift Rates

For any workday that starts before 8A.M. or ends after 6P.M. there is a 10% differential for the applicable worker's hourly rate.

Vacation

After 6 months.....one week.
After 12 months but less than 7 years.....two weeks.
After 7 or more but less than 15 years.....three weeks.
After 15 years or more but less than 25 years.....four weeks.

(C.W.A.)

TILE FINISHER

Tile Finisher

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $50.11
Supplemental Benefit Rate per Hour: $33.61

Overtime
Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays
Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays
None

Shift Rates
Off shift work day (work performed outside the regular 8:00 A.M. to 3:30 P.M. workday): shift differential of one and one quarter (1¼) times the regular straight time rate of pay for the seven hours of actual off-shift work.

(Local #7)

TILE LAYER - SETTER

Tile Layer - Setter

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $65.03
Supplemental Benefit Rate per Hour: $37.11

Overtime
Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
Martin Luther King Jr. Day
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Shift Rates

Off shift work day (work performed outside the regular 8:00 A.M. to 3:30 P.M. workday): shift differential of one and one quarter (1¼) times the regular straight time rate of pay for the seven hours of actual off-shift work.

(Local #7)

TIMBERPERSON

Timberperson

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $56.59
Supplemental Benefit Rate per Hour: $56.41

Overtime

Time and one half the regular rate after an 8 hour day.
Time and one half the regular rate for Saturday.
Double time the regular rate for Sunday.
Saturday may be used as a make-up day at straight time when a day is lost during that week to inclement weather.

Overtime Holidays

Double time the regular rate for work on the following holiday(s).
New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day

Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays

None

Shift Rates

Off shift work commencing between 5:00 P.M. and 11:00 P.M. shall work eight and one half hours allowing for one half hour for lunch. The wage rate shall be 113% of the straight time hourly wage rate. Benefits for off-shift work shall be paid at the straight time rate.

(Local #1556)

TUNNEL WORKER

Blasters, Mucking Machine Operators (Compressed Air Rates)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $75.14
Supplemental Benefit Rate per Hour: $66.51

Tunnel Workers (Compressed Air Rates)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $72.46
Supplemental Benefit Rate per Hour: $64.41

Top Nipper (Compressed Air Rates)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $71.24
Supplemental Benefit Rate per Hour: $63.14

Outside Lock Tender, Outside Gauge Tender,Muck Lock Tender (Compressed Air Rates)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $69.83
Supplemental Benefit Rate per Hour: $62.11

Bottom Bell & Top Bell Signal Person: Shaft Person (Compressed Air Rates)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $69.83
Supplemental Benefit Rate per Hour: $62.11

Changehouse Attendant: Powder Watchperson (Compressed Air Rates)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $61.57
Supplemental Benefit Rate per Hour: $58.18

Blasters (Free Air Rates)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $71.69
Supplemental Benefit Rate per Hour: $63.84

Tunnel Workers (Free Air Rates)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $68.58
Supplemental Benefit Rate per Hour: $61.18

All Others (Free Air Rates)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $63.40
Supplemental Benefit Rate per Hour: $56.62

Microtunneling (Free Air Rates)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $54.86
Supplemental Benefit Rate per Hour: $48.95

Overtime Description

For work performed during excavation and primary concrete tunnel lining phases - Double time the regular rate after an 8 hour day and Saturday, Sunday and on the following holiday(s) listed below.
For Repair-Maintenance Work on Existing Equipment and Facilities - Time and one half the regular rate after a 8 hour day, Saturday, Sunday and double time the regular rate for work on the following holiday(s) listed below.
For Small-Bore Micro Tunneling Machines - Time and one-half the regular rate shall be paid for all overtime.
For work not listed above - Time and one half the regular rate after an 8 hour day and Saturday and double time the regular rate on Sunday and on the following holiday(s) listed below.

Paid Holidays

New Year's Day
Martin Luther King Jr. Day

President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

(Local #147)

UTILITY LOCATOR

(Locate & mark underground utilities including gas for street excavation and utility line repairs)

Utility Locator (Year 7 and above)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $35.50
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Year 5 Second 6 months & Year 6)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $35.50
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Year 5 first 6 months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $34.80
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Year 4)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $31.54
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Year 3)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $28.28
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Year 2)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $25.02
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Year 1)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $21.76
Supplemental Benefit Rate per Hour: $1.43

Utility Locator (Up to 1 year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $18.50
Supplemental Benefit Rate per Hour: $1.43
Supplemental Note: No benefits for the first 90 days of employment.

Overtime

Time and one half the regular rate for work on the following holiday(s).
Time and one half the regular hourly rate after 40 straight time hours in any work week.

Paid Holidays

New Year's Day
Memorial Day
Independence Day
Thanksgiving Day
Christmas Day

Shift Rates

10% shift differential to employees working any shift starting between noon and 5 AM.

Vacation

For up to 1 year	0 hours
For year 1 - 2	48 hours per year
For year 3 - 9	96 hours per year
For year 10 or more	144 hours per year

Sick Days:
For up to 1 year employee receives 40 hours paid sick leave.
For year 1 employee earns 2 hours of paid sick leave for every 100 overtime hours worked.
For year 2 - 9 years employee earns 4 hours of paid sick leave for every 100 overtime hours worked.
For year 10 or more employee earns 6 hours of paid sick leave for every 100 overtime hours worked.

WELDER

WELDER AND FIREWATCH TO BE PAID AT THE RATE OF THE JOURNEYPERSON OR REGISTERED APPRENTICE IN THE TRADE PERFORMING THE WORK.

OFFICE OF THE COMPTROLLER

CITY OF NEW YORK

CONSTRUCTION APPRENTICE PREVAILING WAGE SCHEDULE

Pursuant to Labor Law § 220 (3-e), only apprentices who are individually registered in a bona fide program to which the employer contractor is a participant and registered with the New York State Department of Labor, may be paid at the apprentice rates in this schedule. Apprentices who are not so registered must be paid as journey persons in accordance with the trade classification of the work they actually performed.

Apprentice ratios are established to ensure the proper safety, training and supervision of apprentices. A ratio establishes the number of journey workers required for each apprentice in a program and on a job site. Ratios are interpreted as follows: in the case of a 1:1, 1:4 ratio, there must be one journey worker for the first apprentice, and four additional journey workers for each subsequent apprentice.

TABLE OF CONTENTS

CLASSIFICATION	PAGE
BOILERMAKER	4
BRICKLAYER	5
CARPENTER	6
CARPENTER - HIGH RISE CONCRETE FORMS	7
CEMENT AND CONCRETE WORKER	7
CEMENT MASON	8
DERRICKPERSON & RIGGER (STONE)	9
DOCKBUILDER/PILE DRIVER	9
ELECTRICIAN	10
ELEVATOR CONSTRUCTOR	12
ELEVATOR REPAIR & MAINTENANCE	13
ENGINEER	14
ENGINEER - OPERATING	15
FLOOR COVERER	15
GLAZIER	16
HAZARDOUS MATERIAL HANDLER	17
HEAT & FROST INSULATOR	17
HOUSE WRECKER	18
IRON WORKER - ORNAMENTAL	19
IRON WORKER - STRUCTURAL	20
LABORER - HEAVY & HIGHWAY	20
LABORER - PAVER & ROADBUILDER	21
LABORER - PAVER AND ROADBUILDER - LINE STRIPING (ROADWAY)	22
MARBLE MECHANICS	22

MASON TENDER....24
MASON TENDER (INTERIOR DEMOLITION WORKER)....24
METALLIC LATHER....25
MILLWRIGHT....26
PAINTER....27
PAINTER - BRIDGE & STRUCTURAL STEEL....27
PAINTER - METAL POLISHER....28
PLASTERER....29
PLASTERER - TENDER....29
PLUMBER....30
POINTER, WATERPROOFER, CAULKER, SANDBLASTER, STEAMBLASTER....31
ROOFER....32
SHEET METAL WORKER....33
SIGN ERECTOR....34
STEAMFITTER....36
STEAMFITTER - REFRIGERATION & AIR CONDITIONER....37
STONE MASON - SETTER....37
TAPER....38
TILE LAYER - SETTER....39
TIMBERPERSON....40

BOILERMAKER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Boilermaker (First Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $35.27

Boilermaker (Second Year: 1st Six Months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $37.34

Boilermaker (Second Year: 2nd Six Months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $39.44

Boilermaker (Third Year: 1st Six Months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $41.50

Boilermaker (Third Year: 2nd Six Months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 85% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $43.59

Boilermaker (Fourth Year: 1st Six Months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $45.68

Boilermaker (Fourth Year: 2nd Six Months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 95% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $47.76

(Local #5)

BRICKLAYER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Bricklayer (First 650 Hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 40% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $29.65

Bricklayer (Second 650 Hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $29.65

Bricklayer (Third 650 Hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $29.65

Bricklayer (Fourth 650 Hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $29.65

Bricklayer (Fifth 650 Hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $29.65

Bricklayer (Last 750 Hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $29.65

(Bricklayer District Council)

CARPENTER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Carpenter (First Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour For Building Apprentice: $24.20
Supplemental Benefit Rate Per Hour For Building Apprentice: $18.45

Wage Rate Per Hour For Heavy Apprentice: $27.98
Supplemental Benefit Rate Per Hour For Heavy Apprentice: $38.89

Carpenter (Second Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour For Building Apprentice: $27.20
Supplemental Benefit Rate Per Hour For Building Apprentice: $19.95

Wage Rate Per Hour For Heavy Apprentice: $33.58
Supplemental Benefit Rate Per Hour For Heavy Apprentice: $38.89

Carpenter (Third Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour For Building Apprentice: $31.45
Supplemental Benefit Rate Per Hour For Building Apprentice: $23.55

Wage Rate Per Hour For Heavy Apprentice: $41.96
Supplemental Benefit Rate Per Hour For Heavy Apprentice: $38.89

Carpenter (Fourth Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour For Building Apprentice: $39.33
Supplemental Benefit Rate Per Hour For Building Apprentice: $25.55

Wage Rate Per Hour For Heavy Apprentice: $50.35
Supplemental Benefit Rate Per Hour For Heavy Apprentice: $38.89

(Carpenters District Council)

CARPENTER - HIGH RISE CONCRETE FORMS

(Ratio of Apprentice to Journeyperson: 1 to 1, 2 to 5)

Carpenter - High Rise (First Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $18.27
Supplemental Benefit Rate per Hour: $17.55

Carpenter - High Rise (Second Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $24.70
Supplemental Benefit Rate per Hour: $17.68

Carpenter - High Rise (Third Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $31.28
Supplemental Benefit Rate per Hour: $17.81

Carpenter - High Rise (Fourth Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $38.90
Supplemental Benefit Rate per Hour: $17.96

(Carpenters District Council)

CEMENT AND CONCRETE WORKER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Cement & Concrete Worker (First 1333 hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 53% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $17.97

Cement & Concrete Worker (Second 1333 hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 69% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $23.41

Cement & Concrete Worker (Last 1334 hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 85% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $24.85

(Cement Concrete Workers District Council)

CEMENT MASON

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Cement Mason (First Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $23.77
Supplemental Benefit Rate per Hour: $14.86

Cement Mason (Second Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $28.74
Supplemental Benefit Rate per Hour: $15.16

Cement Mason (Third Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $34.27
Supplemental Benefit Rate per Hour: $15.27

(Local #780)

DERRICKPERSON & RIGGER (STONE)

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Derrickperson & Rigger (stone) - First Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: 50% of Journeyperson's rate

Derrickperson & Rigger (stone) - Second Year: 1st Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: 75% of Journeyperson's rate

Derrickperson & Rigger (stone) - Second Year: 2nd Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: 75% of Journeyperson's rate

Derrickperson & Rigger (stone) - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: 75% of Journeyperson's rate

(Local #197)

DOCKBUILDER/PILE DRIVER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Dockbuilder/Pile Driver (First Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: $27.98
Supplemental Benefit Rate Per Hour: $38.89

Dockbuilder/Pile Driver (Second Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: $33.58
Supplemental Benefit Rate Per Hour: $38.89

Dockbuilder/Pile Driver (Third Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: $41.96
Supplemental Benefit Rate Per Hour: $38.89

Dockbuilder/Pile Driver (Fourth Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: $50.35
Supplemental Benefit Rate Per Hour: $38.89

(Carpenters District Council)

ELECTRICIAN
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Electrician 1st year

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $18.50
Supplemental Benefit Rate per Hour: $18.94
Overtime Supplemental Rate Per Hour: $20.17

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $19.25
Supplemental Benefit Rate per Hour: $19.84
Overtime Supplemental Rate Per Hour: $21.11

Electrician 2nd Year

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $20.50
Supplemental Benefit Rate per Hour: $19.99
Overtime Supplemental Rate Per Hour: $21.35

Effective Period: 4/16/2026 - 6/30/2026

Wage Rate per Hour: $21.25
Supplemental Benefit Rate per Hour: $20.88
Overtime Supplemental Rate Per Hour: $22.29

Electrician 3rd Year

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $22.50
Supplemental Benefit Rate per Hour: $21.04
Overtime Supplemental Rate Per Hour: $22.53

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $23.25
Supplemental Benefit Rate per Hour: $21.93
Overtime Supplemental Rate Per Hour: $23.48

Electrician 4th Year

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $25.50
Supplemental Benefit Rate per Hour: $22.61
Overtime Supplemental Rate Per Hour: $24.30

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $26.25
Supplemental Benefit Rate per Hour: $23.50
Overtime Supplemental Rate Per Hour: $25.25

Electrician 5th Term (0-12 Months)

MIJ 1

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $27.50
Supplemental Benefit Rate per Hour: $26.29
Overtime Supplemental Rate Per Hour: $28.02

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $27.50
Supplemental Benefit Rate per Hour: $26.79
Overtime Supplemental Rate Per Hour: $28.52

Electrician 5th Term (13-18 Months)

MIJ 2

Effective Period: 7/1/2025 - 4/15/2026
Wage Rate per Hour: $33.50

Supplemental Benefit Rate per Hour: $29.51
Overtime Supplemental Rate Per Hour: $31.63

Effective Period: 4/16/2026 - 6/30/2026
Wage Rate per Hour: $33.50
Supplemental Benefit Rate per Hour: $30.01
Overtime Supplemental Rate Per Hour: $32.13

Overtime Description

Overtime Wage paid at time and one half the regular rate

(Local #3)

ELEVATOR CONSTRUCTOR

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)

Elevator (Constructor) - First Year

Effective Period: 7/1/2025 - 3/16/2026
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: $35.48

Effective Period: 3/17/2026 - 6/30/2026
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: $36.18

Elevator (Constructor) - Second Year

Effective Period: 7/1/2025 - 3/16/2026
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: $36.16

Effective Period: 3/17/2026 - 6/30/2026
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: $36.90

Elevator (Constructor) - Third Year

Effective Period: 7/1/2025 - 3/16/2026
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Rate Per Hour: $37.53

Effective Period: 3/17/2026 - 6/30/2026

Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Rate Per Hour: $38.35

Elevator (Constructor) - Fourth Year

Effective Period: 7/1/2025 - 3/16/2026
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: $38.90

Effective Period: 3/17/2026 - 6/30/2026
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: $39.80

(Local #1)

ELEVATOR REPAIR & MAINTENANCE

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)

Elevator Service/Modernization Mechanic (First Year)

Effective Period: 7/1/2025 - 3/16/2026
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Per Hour: $35.45

Effective Period: 3/17/2026 - 6/30/2026
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Per Hour: $36.15

Elevator Service/Modernization Mechanic (Second Year)

Effective Period: 7/1/2025 - 3/16/2026
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Benefit Per Hour: $36.13

Effective Period: 3/17/2026 - 6/30/2026
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Benefit Per Hour: $36.87

Elevator Service/Modernization Mechanic (Third Year)

Effective Period: 7/1/2025 - 3/16/2026
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Per Hour: $37.50

Effective Period: 3/17/2026 - 6/30/2026
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Per Hour: $38.32

Elevator Service/Modernization Mechanic (Fourth Year)

Effective Period: 7/1/2025 - 3/16/2026
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Per Hour: $38.86

Effective Period: 3/17/2026 - 6/30/2026
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Per Hour: $39.76

(Local #1)

ENGINEER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 5)

Engineer - First Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $28.68
Supplemental Benefit Rate per Hour: $35.26

Engineer - Second Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $35.85
Supplemental Benefit Rate per Hour: $35.26

Engineer - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $39.44
Supplemental Benefit Rate per Hour: $35.26

Engineer - Fourth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $43.02
Supplemental Benefit Rate per Hour: $35.26

(Local #15)

ENGINEER - OPERATING

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 5)

Operating Engineer - First Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 40% of Operating Engineer - Road & Heavy Construction V's Rate
Supplemental Benefit Per Hour: $28.40

Operating Engineer - Second Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 50% of Operating Engineer - Road & Heavy Construction V's Rate
Supplemental Benefit Per Hour: $28.40

Operating Engineer - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 60% of Operating Engineer - Road & Heavy Construction V's Rate
Supplemental Benefit Per Hour: $28.40

(Local #14)

FLOOR COVERER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Floor Coverer (First Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $26.54
Supplemental Benefit Rate per Hour: $18.04

Floor Coverer (Second Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $29.60
Supplemental Benefit Rate per Hour: $19.69

Floor Coverer (Third Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $34.05
Supplemental Benefit Rate per Hour: $23.49

Floor Coverer (Fourth Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $42.40
Supplemental Benefit Rate per Hour: $25.49

(Carpenters District Council)

GLAZIER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Glazier (First Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

Glazier (Second Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

Glazier (Third Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Glazier (Fourth Year)

Effective Period: 7/1/2025 - 6/30/2026

Wage and Supplemental Rate Per Hour: 80% of Journeyperson's rate

(Local #1281)

HAZARDOUS MATERIAL HANDLER
(Ratio of Apprentice Journeyperson: 1 to 1, 1 to 3)

Handler (First 1000 Hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $20.76
Supplemental Benefit Rate per Hour: $17.04

Handler (Second 1000 Hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $21.76
Supplemental Benefit Rate per Hour: $17.04

Handler (Third 1000 Hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $24.76
Supplemental Benefit Rate per Hour: $17.04

Handler (Fourth 1000 Hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $26.76
Supplemental Benefit Rate per Hour: $17.04

(Local #78)

HEAT & FROST INSULATOR
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Heat & Frost Insulator (First Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 45% of Journeyperson's rate

Heat & Frost Insulator (Second Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 55% of Journeyperson's rate

Heat & Frost Insulator (Third Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 65% of Journeyperson's rate

Heat & Frost Insulator (Fourth Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 75% of Journeyperson's rate

(Local #12)

HOUSE WRECKER
(TOTAL DEMOLITION)
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

House Wrecker - First Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $21.75
Supplemental Benefit Rate per Hour: $12.12

House Wrecker - Second Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $23.50
Supplemental Benefit Rate per Hour: $12.12

House Wrecker - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $25.00
Supplemental Benefit Rate per Hour: $12.12

House Wrecker - Fourth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $27.50
Supplemental Benefit Rate per Hour: $12.12

(Mason Tenders District Council)

IRON WORKER - ORNAMENTAL

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Iron Worker (Ornamental) - First Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $25.98
Supplemental Benefit Rate per Hour: $15.99

Iron Worker (Ornamental) - Second Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $28.45
Supplemental Benefit Rate per Hour: $17.99

Iron Worker (Ornamental) - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $30.80
Supplemental Benefit Rate per Hour: $18.99

Iron Worker (Ornamental) - Fourth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $34.39
Supplemental Benefit Rate per Hour: $20.99

(Local #580)

IRON WORKER - STRUCTURAL

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Iron Worker (Structural) - 1st Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $30.61
Supplemental Benefit Rate per Hour: $63.80

Iron Worker (Structural) - 7- 18 Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $31.21
Supplemental Benefit Rate per Hour: $63.80

Iron Worker (Structural) - 19 - 36 months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $31.82
Supplemental Benefit Rate per Hour: $63.80

(Local #40 and #361)

LABORER - HEAVY & HIGHWAY

(Ratio Apprentice to Journeyperson: 1 to 1, 1 to 3)

Laborer - Heavy & Highway - First 1000 hours

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: $55.73

Laborer - Heavy & Highway - Second 1000 hours

Effective Period: 7/1/2025 - 6/30/2026

Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: 55.73

Laborer - Heavy & Highway - Third 1000 hours

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: 55.73

Laborer - Heavy & Highway - Fourth 1000 hours

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Rate Per Hour: $55.73

(Local #731)

LABORER - PAVER & ROADBUILDER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Paver and Roadbuilder - First Year (Minimum 1000 hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $32.21
Supplemental Benefit Rate per Hour: $27.82

Paver and Roadbuilder - Second Year (Minimum 1000 hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $33.85
Supplemental Benefit Rate per Hour: $27.82

(Local#1010)

LABORER - PAVER AND ROADBUILDER - LINE STRIPING (ROADWAY)

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Paver and Roadbuilder - Line Striping (Roadway) - First Year (Minimum 1000 hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $31.36
Supplemental Benefit Rate per Hour: $19.27

Paver and Roadbuilder - Line Striping (Roadway) - Second Year (Minimum 1000 hours)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $33.00
Supplemental Benefit Rate per Hour: $19.27

(Local #1010)

MARBLE MECHANICS

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Cutters & Setters - 0-3000 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

NO BENEFITS PAID DURING THE FIRST TWO MONTHS (PROBATIONARY PERIOD)

Cutters & Setters - 3001-3750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Cutters & Setters - 3751-4500 Hours

Effective Period: 7/1/2025 - 6/30/2026

Wage and Supplemental Rate Per Hour: 65% of Journeyperson's rate

Cutters & Setters - 4501-5250 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 70% of Journeyperson's rate

Cutters & Setters - 5251-6000 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 75% of Journeyperson's rate

Cutters & Setters - 6001-7500 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 85% of Journeyperson's rate

Polishers & Finishers - First 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

NO BENEFITS PAID DURING THE FIRST TWO MONTHS (PROBATIONARY PERIOD)

Polishers & Finishers - Second 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 55% of Journeyperson's rate

Polishers & Finishers - Third 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 65% of Journeyperson's rate

Polishers & Finishers - Fourth 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 75% of Journeyperson's rate

Polishers & Finishers Last 700 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 85% of Journeyperson's rate

(Local #7)

MASON TENDER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Mason Tender - First Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $21.75
Supplemental Benefit Rate per Hour: $11.62

Mason Tender - Second Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $23.50
Supplemental Benefit Rate per Hour: $11.62

Mason Tender - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $25.00
Supplemental Benefit Rate per Hour: $11.62

Mason Tender - Fourth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $27.50
Supplemental Benefit Rate per Hour: $11.62

(Local #79)

MASON TENDER (INTERIOR DEMOLITION WORKER)
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Mason Tender (Interior Demolition) - First Year

Effective Period: 7/1/2025 - 6/30/2026

Wage Rate per Hour: **$21.75**
Supplemental Benefit Rate per Hour: **$11.27**

Mason Tender (Interior Demolition) - Second Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: **$23.50**
Supplemental Benefit Rate per Hour: **$11.27**

Mason Tender (Interior Demolition) - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: **$25.00**
Supplemental Benefit Rate per Hour: **$11.27**

Mason Tender (Interior Demolition) - Fourth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: **$27.50**
Supplemental Benefit Rate per Hour: **$11.27**

(Local #79)

METALLIC LATHER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Metallic Lather (First Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: **$22.55**
Supplemental Benefit Rate per Hour: **$17.87**

Metallic Lather (Second Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: **$25.00**
Supplemental Benefit Rate per Hour: **$17.92**

Metallic Lather (Third Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $28.00
Supplemental Benefit Rate per Hour: $16.92

Metallic Lather (Fourth Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $30.00
Supplemental Benefit Rate per Hour: $16.92

(Local #46)

MILLWRIGHT
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Millwright (First Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $32.74
Supplemental Benefit Rate per Hour: $38.29

Millwright (Second Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $38.39
Supplemental Benefit Rate per Hour: $41.99

Millwright (Third Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $44.04
Supplemental Benefit Rate per Hour: $46.34

Millwright (Fourth Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $55.34
Supplemental Benefit Rate per Hour: $53.10

(Local #740)

PAINTER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Painter - Brush & Roller - First Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $17.90
Supplemental Benefit Rate per Hour: $19.64

Painter - Brush & Roller - Second Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $22.38
Supplemental Benefit Rate per Hour: $25.19

Painter - Brush & Roller - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $26.85
Supplemental Benefit Rate per Hour: $29.72

Painter - Brush & Roller - Fourth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $35.80
Supplemental Benefit Rate per Hour: $38.54

(District Council of Painters)

PAINTER - BRIDGE & STRUCTURAL STEEL

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Painter - Bridge & Structural Steel (First Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

Painter - Bridge & Structural Steel (Second Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Painter - Bridge & Structural Steel (Third Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 80% of Journeyperson's rate

(Local #806)

PAINTER - METAL POLISHER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Metal Polisher (First Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $20.17
Supplemental Benefit Rate per Hour: $8.91
New Construction - Wage Rate Per Hour: $20.56
Scaffold Over 34 Feet - Wage Rate Per Hour: $22.67

Metal Polisher (Second Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $22.18
Supplemental Benefit Rate per Hour: $8.91
New Construction - Wage Rate Per Hour: $22.62
Scaffold Over 34 Feet - Wage Rate Per Hour: $24.68

Metal Polisher (Third Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $24.20
Supplemental Benefit Rate per Hour: $8.91
New Construction - Wage Rate Per Hour: $24.74
Scaffold Over 34 Feet - Wage Rate Per Hour: $26.70

(Local 8A-28)

PLASTERER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)
(Each Term is 800 Hours.)

Plasterer - First Term

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: $17.48

Plasterer - Second Term

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: $18.63

Plasterer - Third Term

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Rate Per Hour: $20.93

Plasterer - Fourth Term

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: $22.10

(Local #262)

PLASTERER - TENDER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Plasterer Tender - First Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $21.75
Supplemental Benefit Rate per Hour: $11.62

Plasterer Tender - Second Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $23.50
Supplemental Benefit Rate per Hour: $11.62

Plasterer Tender - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $25.00
Supplemental Benefit Rate per Hour: $11.62

Plasterer Tender - Fourth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $27.50
Supplemental Benefit Rate per Hour: $11.62

(Local #79)

PLUMBER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Plumber - First Year: 1st Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $19.00
Supplemental Benefit Rate per Hour: $5.43

Plumber - First Year: 2nd Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $21.00
Supplemental Benefit Rate per Hour: $6.43

Plumber - Second Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $30.90
Supplemental Benefit Rate per Hour: $23.81

Plumber - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $33.00
Supplemental Benefit Rate per Hour: $23.81

Plumber - Fourth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $35.85
Supplemental Benefit Rate per Hour: $23.81

Plumber - Fifth Year: 1st Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $37.25
Supplemental Benefit Rate per Hour: $23.81

Plumber - Fifth Year: 2nd Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $49.32
Supplemental Benefit Rate per Hour: $23.81

(Plumbers Local #1)

POINTER, WATERPROOFER, CAULKER, SANDBLASTER, STEAMBLASTER

(Exterior Building Renovation)
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Pointer, Waterproofer, Caulker, Sandblaster, Steamblaster - First Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $33.58
Supplemental Benefit Rate per Hour: $15.65

Pointer, Waterproofer, Caulker, Sandblaster, Steamblaster - Second Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $38.04
Supplemental Benefit Rate per Hour: $21.00

Pointer, Waterproofer, Caulker, Sandblaster, Steamblaster - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $44.19
Supplemental Benefit Rate per Hour: $24.75

Pointer, Waterproofer, Caulker, Sandblaster, Steamblaster - Fourth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $53.10
Supplemental Benefit Rate per Hour: $25.75

(Bricklayer District Council)

ROOFER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)

Roofer - First Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 38% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $7.86

Roofer - Second Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 45% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $18.16

Roofer - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $20.10

Roofer - Fourth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $23.98

Roofer - Fifth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: $29.82

(Local #8)

SHEET METAL WORKER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Sheet Metal Worker (0-6 Months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $18.97
Supplemental Benefit Rate per Hour: $8.09

Sheet Metal Worker (7-18 Months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $18.97
Supplemental Benefit Rate per Hour: $22.10

Sheet Metal Worker (19-30 Months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $24.45
Supplemental Benefit Rate per Hour: $29.88

Sheet Metal Worker (31-36 Months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $29.95
Supplemental Benefit Rate per Hour: $35.37

Sheet Metal Worker (37-42 Months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $29.95
Supplemental Benefit Rate per Hour: $35.37

Sheet Metal Worker (43-48 Months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $38.19
Supplemental Benefit Rate per Hour: $43.64

Sheet Metal Worker (49-54 Months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $38.19
Supplemental Benefit Rate per Hour: $43.64

Sheet Metal Worker (55-60 Months)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $43.66
Supplemental Benefit Rate per Hour: $49.16

(Local #28)

SIGN ERECTOR
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Sign Erector - First Year: 1st Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 35% of Journeyperson's rate
Supplemental Rate Per Hour: $17.84

Sign Erector - First Year: 2nd Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 40% of Journeyperson's rate
Supplemental Rate Per Hour: $20.25

Sign Erector - Second Year: 1st Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 45% of Journeyperson's rate
Supplemental Rate Per Hour: $22.66

Sign Erector - Second Year: 2nd Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: $25.09

Sign Erector - Third Year: 1st Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: $33.83

Sign Erector - Third Year: 2nd Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: $36.81

Sign Erector - Fourth Year: 1st Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Rate Per Hour: $40.63

Sign Erector - Fourth Year: 2nd Six Months

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Rate Per Hour: $43.70

Sign Erector - Fifth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: $46.76

Sign Erector - Sixth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Rate Per Hour: $49.80

(Local #137)

STEAMFITTER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Steamfitter - First Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate and Supplemental Per Hour: 40% of Journeyperson's rate

Steamfitter - Second Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate and Supplemental Rate Per Hour: 50% of Journeyperson's rate.

Steamfitter - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate and Supplemental Rate per Hour: 60% of Journeyperson's rate.

Steamfitter - Fourth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate and Supplemental Rate Per Hour: 70% of Journeyperson's rate.

Steamfitter - Fifth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate and Supplemental Rate Per Hour: 80% of Journeyperson's rate.

(Local #638)

STEAMFITTER - REFRIGERATION & AIR CONDITIONER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Refrigeration & Air Conditioner (First Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $22.31
Supplemental Benefit Rate per Hour: $14.47

Refrigeration & Air Conditioner (Second Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $26.94
Supplemental Benefit Rate per Hour: $15.91

Refrigeration & Air Conditioner (Third Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $31.38
Supplemental Benefit Rate per Hour: $17.41

Refrigeration & Air Conditioner (Fourth Year)

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $37.90
Supplemental Benefit Rate per Hour: $19.44

(Local #638-B)

STONE MASON - SETTER

(Ratio Apprentice of Journeyperson: 1 to 1, 1 to 2)

Stone Mason - Setters - First 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

Stone Mason - Setters - Second 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Third 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Stone Mason - Setters - Fourth 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 70% of Journeyperson's rate

Stone Mason - Setters - Fifth 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 80% of Journeyperson's rate

Stone Mason - Setters - Sixth 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 90% of Journeyperson's rate

(Bricklayers District Council)

TAPER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Drywall Taper - First Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $22.51
Supplemental Benefit Rate per Hour: $14.65

Drywall Taper - Second Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $24.24
Supplemental Benefit Rate per Hour: $25.28

Drywall Taper - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $29.08
Supplemental Benefit Rate per Hour: $27.41

Drywall Taper - Fourth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate per Hour: $38.78
Supplemental Benefit Rate per Hour: $31.66

(Local #1974)

TILE LAYER - SETTER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Tile Layer - Setter - First 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour:35% of Journeyperson's rate

Tile Layer - Setter - Second 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour 40% of Journeyperson's rate

Tile Layer - Setter - Third 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

Tile Layer - Setter - Fourth 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 55% of Journeyperson's rate

Tile Layer - Setter - Fifth 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Tile Layer - Setter - Sixth 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 65% of Journeyperson's rate

Tile Layer - Setter - Seventh 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 70% of Journeyperson's rate

Tile Layer - Setter - Eighth 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 75% of Journeyperson's rate

Tile Layer - Setter - Ninth 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour:80% of Journeyperson's rate

Tile Layer - Setter - Tenth 750 Hours

Effective Period: 7/1/2025 - 6/30/2026
Wage and Supplemental Rate Per Hour: 90% of Journeyperson's rate

(Local #7)

TIMBERPERSON

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Timberperson - First Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: $25.96
Supplemental Rate Per Hour: $38.69

Timberperson - Second Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: $31.07
Supplemental Rate Per Hour: $38.69

Timberperson - Third Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: $38.72
Supplemental Rate Per Hour: $38.69

Timberperson - Fourth Year

Effective Period: 7/1/2025 - 6/30/2026
Wage Rate Per Hour: $46.38
Supplemental Rate Per Hour: $38.69

(Local #1536)

Leonard A. Mancusi
SENIOR ASSISTANT COMPTROLLER

THE CITY OF NEW YORK
OFFICE OF THE COMPTROLLER
1 CENTRE STREET ROOM 1120
NEW YORK, N.Y. 10007-2341

TELEPHONE: (212) 669-3622
FAX NUMBER: (212) 669-8499

ALAN G. HEVESI
COMPTROLLER

MEMORANDUM

November 6, 2000

To *Agency Chief Contracting Officers*

From: *Leonard A. Mancusi*

Re: *Security at Construction Sites*

Prior to the enactment of Administrative Code §6-109, security guards on construction sites were not subject to prevailing wages. Security guards under the New York State labor law are covered under §230 which provides that prevailing wages are to be paid for security guards in existing buildings. §6-109 of the Administrative Code which was enacted in 1996 closed this loophole by including all security guards working pursuant to a city contract as a prevailing wage trade.

Although some construction contract boilerplate language has been amended to include §6-109, sub-contractors performing security services have advised us that they were not aware of this provision and, since traditionally, security guards were not a covered trade on construction sites, and they were not advised by a prime contractor that they would have to pay prevailing wages, they have not been doing so.

To avoid the possibility of issuing stop payments against prime contractors for the failure of their security service sub-contractors to pay

prevailing wages, we suggest that you write to all your existing security guard sub-contractors and their primes and in the future, upon approval of a security guard sub-contractor, advise the contractors of their obligation to pay prevailing wages under §6-109 of the Administrative Code.

As always, your cooperation is appreciated.

LAM:er
ACCO.SECURITY AT SITES

THE CITY OF NEW YORK
OFFICE OF THE COMPTROLLER
BUREAU OF LABOR LAW
1 CENTRE STREET
NEW YORK, NY 10007

BRAD LANDER
COMPTROLLER

COMPTROLLER'S PREVAILING WAGE MEMORANDUM REGARDING FLAG PERSONS

June 1, 2024

This memorandum supersedes and replaces the Comptroller's Prevailing Wage Memoranda dated May 21, 1998 and related clarification dated March 13, 2001 concerning Flag Persons. This memorandum sets forth the superseding determination of the New York City Comptroller concerning the applicability of Article 8, Section 220 of the New York Labor Law (the "Labor Law") to individuals who perform traffic control duty or "flagger" tasks in connection with public works construction projects within the jurisdiction of the City of New York. The guidance set forth herein is effective July 1, 2024 and applies only to public works contracts and subcontracts solicited on or after such date.

For purposes of this memorandum, "traffic control duty" means tasks necessary or appropriate to alleviate congestion by directing the flow of pedestrian and/or vehicular traffic away from the vicinity of the construction site using a sign or flag. Workers performing traffic control duty in connection with a public works construction project, whether or not such workers are on, adjacent to, or in close proximity to the construction site, are performing the work of a construction "laborer," as directing traffic away from the job site serves to protect the public and safeguard the work crew. Such workers are thus subject to the prevailing wage requirements of Article 8, Section 220 of the Labor Law as "laborers, workmen, or mechanics." Accordingly, the Prevailing Rate of Wages and Supplements applies to such individuals.

Additionally, workers who perform "flagger" tasks relating to the protection of the public and/or work crew, including but not limited to erecting traffic cones, setting up construction site barriers, and directing the movement of trucks or construction equipment in, on, and off the site, also are subject to the requirements of Article 8, Section 220 of the Labor Law and the Prevailing Rate of Wages and Supplements.

This position is consistent with the New York State Department of Labor's position under Article 8 of the New York Labor Law and the U.S. Department of Labor's position under the Davis-Bacon Act and will promote and streamline compliance with prevailing wage requirements on the various public works construction projects within New York City.

If the trade performing the underlying work performs its own flagging or traffic control, e.g., bridge painters, the flagger or traffic control worker shall receive the same wages as the underlying trade. In the absence of an underlying trade, the flagger or traffic control worker shall receive the wages as set forth in the "Flagger" section of the New York City Comptroller's Construction Worker Prevailing Wage Schedule.

Contractors, agencies, and members of the public are encouraged to contact the Bureau of Labor Law to seek clarification regarding specific instances to ensure compliance with prevailing wage regulations and this memorandum.

Changes between the 7/1/2024 and 7/1/2025 Single Contract General Conditions

NOTE: The list below is intended as a guide and does not include minor editing.
The text of the General Conditions and the Addendum to the General Conditions govern.

Section No.	Change
01 21 00.20	Section revised throughout to clarify eligible scope of work and requirements
01 32 16.10	1.10: language added to account for inspections and approvals 1.12C: language added related to baseline schedules
01 32 16.20	1.10: language added to account for inspections and approvals 1.12C: language added related to baseline schedules
01 32 16.30	1.10: language added to account for inspections and approvals 1.12C: language added related to baseline schedules
01 35 03	1.2: language revised in coordination with Standard Construction Contract
01 35 06	1.2: language revised in coordination with Standard Construction Contract
01 73 00	3.11: requirements for trucking added
01 81 13.03	Section Removed
01 81 13.13	Section Removed

Department of Design and Construction

Issue Date: July 1, 2025

DDC STANDARD GENERAL CONDITIONS

FOR SINGLE CONTRACT PROJECTS

DIVISION 01 – DDC STANDARD GENERAL CONDITIONS – SINGLE CONTRACT PROJECTS
TABLE OF CONTENTS

SECTION NO.	SECTION TITLE
01 10 00	SUMMARY
01 21 00.10	PRICE ADJUSTMENT ALLOWANCE
01 21 00.20	EXPANDED WORK ALLOWANCE
01 21 00.30	PROJECT WORK ACCELERATION ALLOWANCE
01 25 00	SUBSTITUTION PROCEDURES
01 29 00	PAYMENT PROCEDURES
01 31 00	PROJECT MANAGEMENT AND COORDINATION
01 32 00	CONSTRUCTION PROGRESS DOCUMENTATION
01 32 16.10	PROJECT SCHEDULES (METHOD A)
01 32 16.20	PROJECT SCHEDULES (METHOD B)
01 32 16.30	PROJECT SCHEDULES (METHOD C)
01 32 33	PHOTOGRAPHIC DOCUMENTATION
01 33 00	SUBMITTAL PROCEDURES
01 35 03	GENERAL MECHANICAL REQUIREMENTS
01 35 06	GENERAL ELECTRICAL REQUIREMENTS
01 35 26	SAFETY REQUIREMENTS PROCEDURES
01 35 91	HISTORIC TREATMENT PROCEDURES
01 40 00	QUALITY REQUIREMENTS
01 42 00	REFERENCES
01 50 00	TEMPORARY FACILITIES, SERVICES AND CONTROLS
01 54 11	TEMPORARY ELEVATORS AND HOISTS
01 54 23	TEMPORARY SCAFFOLDING AND PLATFORMS
01 60 00	PRODUCT REQUIREMENTS
01 73 00	EXECUTION
01 74 19	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
01 77 00	CLOSEOUT PROCEDURES
01 78 39	CONTRACT RECORD DOCUMENTS
01 79 00	DEMONSTRATION AND OWNERS PRE-ACCEPTANCE ORIENTATION
01 81 13.04	SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS
01 81 13.10	ENVIRONMENTALLY PREFERABLE PURCHASING (EPP) COMPLIANCE

SECTION NO.	SECTION TITLE
01 81 19	INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS
01 81 21	SUSTAINABLE CONSTRUCTION REQUIREMENTS
01 91 13	GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS
01 91 15	GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE

SECTION 01 10 00
SUMMARY

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

B. Addendum to the General Conditions: These General Conditions include and are supplemented by the Addendum to the General Conditions (the "Addendum"). The Addendum includes the following: (1) schedules referred to in these General Conditions, (2) information regarding the applicability of various articles, and (3) amended articles, if any.

1.2 SUMMARY:

A. This section includes the following:

1. Scope and Intent
2. Provisions Referenced in the Contract
3. Performance of Work During Non-Regular Work Hours (Pursuant to a Change Order)
4. Interruption of Services at Existing Facilities

1.3 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: "Design Consultant" means the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.4 SCOPE AND INTENT:

A. Description of Project: Refer to the Addendum for a description of the Project.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.4 B

B. LEED: The City of New York will seek U.S. Green Building Council (USGBC) LEED (Leadership in Energy and Environmental Design) certification for this Project as specified in Section 01 81 13.04 "SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS", and the Addendum to the General Conditions.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.4 C

C. COMMISSIONING: The Project will be commissioned by an independent third party under separate contract with the City of New York. Commissioning must be in accordance with ASHRAE and USGBC LEED-NC procedures, as described in Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS, and/ or Section 01 91 15 GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE and the Addendum to the General Conditions. The Contractor must cooperate with the commissioning agent and provide whatever assistance is required.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.4 D

D. PROGRESS SCHEDULE: Refer to Section 01 32 16.1 PROGRESS SCHEDULES (METHOD A) or 01 32 16.2 PROGRESS SCHEDULES (METHOD B) or 01 32 16.3 PROGRESS SCHEDULES (METHOD C) and the Addendum to the General Conditions for requirements of the Project.

E. COMPLETION OF WORK: Work to be done under the Contract is comprised of the furnishing of all labor, materials, equipment and other appurtenances, and obtaining all regulatory agency approvals necessary and required to complete the construction work in accordance with the Contract.

F. OMISSION OF DETAILS: All work called for in the Specifications applicable to the Contract but not shown on the Contract Drawings in their present form, or vice versa, is required, and must be performed by the Contractor as though it were originally delineated or described. The cost of such work will be deemed included in the total Contract Price.

G. WORK NOT IN SPECIFICATIONS OR CONTRACT DRAWINGS: Work not particularly specified in the Specifications nor detailed on the Contract Drawings but involved in carrying out their intent or in the complete and proper execution of the Work, is required, and must be performed by the Contractor. The cost of such work will be deemed included in the total Contract Price.

H. SILENCE OF THE SPECIFICATIONS: The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, will be regarded as meaning that only the best practice is to prevail and that only the best material and workmanship is to be used and interpretation of the Specifications will be made upon that basis.

I. CONFLICT BETWEEN CONTRACT DRAWINGS AND SPECIFICATIONS: Should any conflict occur in or between the Drawings and Specifications, the Contractor will be deemed to have estimated the most expensive way of doing the Work unless the Contractor asked for and obtained a decision in writing from the Commissioner before the submission of the bid as to what must govern.

1.5 CONTRACT DRAWINGS AND SPECIFICATIONS:

A. SCHEDULE C - The Contract Drawings are listed in Schedule C, which is set forth in the Addendum. Such drawings referred to in the Contract, and in the applicable Specifications for the Contract, bear the general title:

City of New York
Department of Design and Construction
Division of Public Buildings

B. DOCUMENTS FURNISHED TO THE CONTRACTOR - After the award of the Contract, the Contractor will be furnished with five (5) complete sets of paper prints of all Contract Drawings mentioned in Paragraph A above, as well as a copy of the Specifications.

C. ADDITIONAL COPIES of Drawings and Specifications, when requested, will be furnished to the Contractor if available.

D. SUPPLEMENTARY DRAWINGS - When, in the opinion of the Commissioner, it becomes necessary to more fully explain the work to be done, or to illustrate the work further, or to show any changes which may be required, drawings known as Supplementary Drawings will be prepared by the Commissioner.

E. COMPENSATION - Where Supplementary Drawings entail extra work, compensation therefore to the Contractor will be subject to the terms of the Contract. The Supplementary Drawings will be binding upon the Contractor with the same force as the Contract Drawings.

F. SUPPLEMENTARY DRAWING PRINTS - Three (3) copies of prints of these Supplementary Drawings will be furnished to the Contractor.

G. COPIES TO SUBCONTRACTORS - The Contractor must furnish each of its Subcontractors and material suppliers such copies of Contract Drawings, Supplementary Drawings, or copies of the Specifications as may be required for its work.

1.6 COORDINATION:

A. COORDINATION AND COOPERATION - The Contractor must consult and study the requirements of the Contract Drawings and Specifications for all required work, including all work to be performed by trade Subcontractors, so that the Contractor may become acquainted with the work of the Project as a whole in order to achieve the proper coordination and cooperation necessary for the efficient and timely performance of the work.

B. CONTRACTOR TO CHECK DRAWINGS: - The Contractor must verify all dimensions, quantities and details shown on the Contract Drawings, Schedules, or other data received from the Commissioner, and must notify the Commissioner of all errors, omissions, conflicts and discrepancies found therein. Notice of such errors will be given before the Contractor proceeds with any work. Figures must be used in preference to scale dimensions and large-scale drawings in preference to small-scale drawings.

1.7 SHOP DRAWINGS AND RECORD DRAWINGS:

A. Refer to Section 01 33 00 SUBMITTAL PROCEDURES and Section 01 78 39 CONTRACT RECORD DOCUMENTS for requirements applicable to shop drawings and record drawings.

1.8 TEMPORARY FACILITIES, SERVICES AND CONTROLS:

A. Refer to Section 01 50 00 TEMPORARY FACILITIES SERVICES AND CONTROLS for the responsibilities of the Contractor.

1.9 DUST CONTROL:

A. The Contractor must prepare, execute and manage a “Dust Control Plan” for the prevention of the emission of dust from construction related activities in compliance with 15 RCNY 13-01 et. seq.

1.10 PROVISIONS REFERENCED IN THE CONTRACT:

A. SCHEDULE A - Various Articles of the Contract refer to requirements set forth in Schedule A of the General Conditions. Schedule A, which is included in the Addendum, sets forth (1) the referenced Articles of the Contract, and (2) the specific requirements applicable to the Contract.

B. EXTENSION OF TIME - Applications for Extensions of Time, as indicated in Article 13 of the Contract, must be made in accordance with the Rules of the Procurement Policy Board.

C. ULTRA LOW SULFUR DIESEL FUEL AND BEST AVAILABLE TECHNOLOGY REPORTING: The Contractor must submit reports to the Commissioner regarding the use of Ultra Low Sulfur Diesel Fuel in Non-Road Vehicles, and the implementation of Best Available Technology (BAT), as set forth in Article 5.4 of the Contract. Such reports must be submitted in accordance with the schedule, format, directions, and procedures established by the Commissioner.

1.11 PERFORMANCE OF WORK DURING NON-REGULAR WORK HOURS:

A. NON-REGULAR WORK HOURS: The Commissioner may issue a change order in accordance with Article 25 of the Contract which, (1) directs the Contractor to perform the Work, or specific components thereof, during other than regular work hours (i.e., evenings, weekends and holidays), and (2) provides compensation to the Contractor for costs in connection with the performance of Work during other than regular work hours. The Commissioner may issue a change order if a delay has occurred and such delay is not the fault of the Contractor, or if the Work is of such an important nature that delay in completing such work would result in serious disadvantage to the public.

B. PROCEDURE: The Contractor must: (1) obtain whatever permits may be required for performance of the Work during other than regular business hours, and (2) pay all necessary fees in connection with such permits. In addition, if directed by the Commissioner, the Contractor must make immediate application to the Commissioner of the Department of Labor, State of New York, for dispensation in accordance with Subdivision 2 of Section 220 of the Labor Law.

1.12 INTERRUPTION OF SERVICES AT EXISTING FACILITIES:

A. EVENING AND WEEKEND WORK - Where performance of the Work requires the temporary shutdown(s) of services, such shutdown(s) must be made at night or on weekends or at such times that will cause no interference with the established routines and operations of the facility in question.

1 Where weekend or evening work is required due to unavoidable service shutdowns, such work will be performed at no extra cost to the City. Components of the Work that must be performed during other than regular work hours are indicated in the Drawings and/or the Specifications.

B. INTERRUPTION OF EXISTING FACILITIES:

1 The Contractor must not interrupt any of the services of the facility nor interfere with such services in any way without the permission of the Commissioner. Such interruption or interferences must be made as brief as possible, and only at such time stated.

2 Under no circumstances will the Contractor, its Subcontractors, or its workers, be permitted to use any part of the project as a shop, without the permission of the Commissioner.

3 Unnecessary noise must be avoided at all times and necessary noise must be reduced to a minimum.

4 Toilet facilities, water, and electricity must be operational at all times (i.e. 24/7). No services of the facility can be interrupted in any way without the permission of the Commissioner. Careful coordination of all Work with the Commissioner must be done to maintain the operational level of the Project personnel at the facility.

5 The Contractor must schedule the Work to avoid noise interference that will affect the normal functions of the facility. In particular, construction operations producing noises that are objectionable to the functions of the facility must be scheduled at times of day or night, day of the week, or weekend, which will not interfere with personnel at the facility. Any additional cost resulting from this scheduling will be borne by the Contractor.

6 The Contractor must arrange to work continuously, including evening and weekend hours, if required,

to assure that services will be shut down only during the time actually required to make the necessary connections to the existing facility.

7 The Contractor must give ample written notice in advance to the Commissioner and personnel at the facility of any required shutdown.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 21 00.10

PRICE ADJUSTMENT ALLOWANCE

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 21 00.10

PART I - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) City of New York Standard Construction Contract.

1.2 SUMMARY

A. This Section includes:

1. Asphalt Price Adjustment
2. Fuel Price Adjustment
3. Steel Price Adjustment

1.3 SCOPE AND INTENT

A. This section will provide for additional compensation to the Contractor for increases, or repayment by the Contractor for decreases, in the price of asphalt, fuel, or steel products.

B. Price Adjustments will be made only for eligible work as defined below. With respect to asphalt and steel eligible work items, price adjustment will be paid, if eligible, only after the items have been permanently incorporated into the Work and accepted by the Commissioner. With respect to fuel, price adjustment will be paid, if eligible, only after fuel has been delivered to the Project site.

C. No adjustment will be provided for any extra work paid by fixed price in accordance with the Standard Construction Contract Article 25.3.2 or paid for on a time and material basis per Standard Construction Contract Article 26. Additional quantities of existing Contract pay items at original bid prices will be considered eligible for asphalt, fuel, and steel price adjustments.

D. Temporary work performed by the Contractor at its own expense will not be eligible for price adjustment. Notwithstanding the foregoing, temporary asphalt will be eligible if shown on the Contract Drawings or required to complete the Work and must be approved in advance by the Commissioner.

E. The Contractor, its Subcontractor(s) and/or Materialmen, must, when directed by the Commissioner, provide

any and all Project documents and/or records the Commissioner deems pertinent to his/her determination with respect to the price adjustment. If requested by the Commissioner, the Contractor, its Subcontractor(s) and/or Materialmen, must provide copies of Project documents and/or records.

F. Failure by the Contractor, its Subcontractor(s) and/or Materialmen, to comply strictly with the requirement to provide Project records will constitute a waiver of any claim for additional compensation the Contractor may have in connection with the price adjustment request.

G. Project documents and/or records include, without limitation, Bid and Contract Documents, shop drawings, manufacturing and/or shipping data, as-built drawings, books of account, financial statements, invoices, vouchers, records, daily job diaries and reports.

H. If the Contractor is paid additional compensation in accordance with this Section, the Contractor must pay a properly allocated share of such additional compensation to the applicable Subcontractor(s) and/or Materialmen.

1.4 PRICE ADJUSTMENT VALUES

A. The monthly average asphalt prices, monthly average fuel prices, steel cost basis and steel index values will be posted on the NYS Department of Transportation (NYSDOT) website: https://www.dot.ny.gov/main/business-center/contractors/construction-division/fuel-asphalt-steel-price-adjustments

B. Historical index values are available as issued Engineering Bulletins on the NYSDOT website: https://www.dot.ny.gov/eieb

1.5 ASPHALT PRICE ADJUSTMENT

A. **Price Changes.** The asphalt price adjustment will be based solely on the price changes for asphalt as determined by the formulas below. No adjustment will be made if the monthly average posted price is within $15.00 of the asphalt index price. No consideration will be given to the situation where the price paid by the Contractor, its Subcontractors, or the Contractor's or Subcontractor's supplier(s) exceeds the monthly average posted price.

B. **Applicability**. The asphalt price adjustment will apply to all permanent asphalt pavement items. The asphalt price adjustment will apply to temporary asphalt pavement if the temporary asphalt is shown on the Contract Drawings or approved in advance by the Commissioner. No price adjustment will be made for tack coat or pothole cold patch.

C. **Prices**. The asphalt index price and the monthly average posted price are defined as follows:

1. Asphalt Index Price. The asphalt index price is a price per ton of binder (also referred to as liquid bitumen or asphaltic cement) used solely as a basis from which to compute asphalt price adjustments. The asphalt index price will be the monthly average posted price for the month and year the bid opening for the Project.

2. Monthly Average Posted Price. The monthly asphalt index prices will be determined by NYSDOT using the methods set forth in NYSDOT Standard Specification Section 698.

D. **Quantity**. The quantity of asphalt in tons considered for adjustment will be determined by the tons of asphalt

actually placed. This will be calculated using the measured volume of asphalt placed, and the asphalt's in-place density, as measured in the field. Quantities of asphalt will be measured to the nearest 0.1 ton.

E. **Adjustment**. Asphalt price adjustment will be based on the following formulas:

1. When price increases: Price Adjustment = (Quantity of Asphalt) x (Monthly Average Posted Price - Asphalt Index Price - $15.00)

2. When price decreases: Price Adjustment = (Quantity of Asphalt) x (Monthly Average Posted Price - Asphalt Index Price + $15.00)

F. **Payment of the Price Adjustment.** The Contractor is required to keep a log of all asphalt incorporated into the Project that is eligible for the price adjustment. The log must keep track of the date when the asphalt was purchased, the quantity of the asphalt, the Asphalt Index Price and the Monthly Average Posted Price, as determined in accordance with 1.5.C.

1. When the adjustment amount, calculated in accordance with 1.5.E, exceeds $10,000.00 for all eligible asphalt incorporated into the Project, the Contractor must submit with its monthly payment requisition, the request for payment of the asphalt price adjustment.

1.6 FUEL PRICE ADJUSTMENT

A. **Price Changes**. The fuel price adjustment will be based solely on the price changes for fuel as determined by the formulas below. No adjustment will be made if the monthly average posted price is within $0.10 per gallon of the fuel index price. No consideration will be given to the situation where the price paid by the Contractor, its Subcontractors, or the Contractor's or Subcontractor's supplier(s) exceeds the monthly average posted price.

B. **Applicability**. The intent of the fuel price adjustment is to cover on-site equipment and vehicles only as delineated below.

1. The fuel price adjustment will apply for fuel used in:
   a. Diesel equipment used on site, such as backhoes, excavators, cranes.
   b. Stationary equipment used on site, such as trailer or skid mounted compressors, generators, or light towers.
   c. Gasoline or diesel trucks and vans that are assigned to the site full-time, which may be used for off-site pickups and deliveries.
   d. Equipment used for temporary heating.

2. The fuel price adjustment will not apply to:
   a. On-site gasoline powered hand tools, such as chainsaws, cut-off saws, pressure washers, small generators, etc.
   b. Vehicles (cars, pickup trucks) that are also used for commuting.
   c. Delivery vehicles.
   d. Any equipment at the Contractor's shop, manufacturer's shop, or other off-site facility.

C. **Prices**. The fuel index price and the monthly average posted price are defined as follows:

1. Fuel Index Price. A price per gallon of fuel used solely as a basis from which to compute fuel price adjustments. The fuel index price will be the monthly average posted price for the month of the bid letting.

2. Monthly Average Posted Price. The monthly fuel index prices will be determined by NYSDOT using the methods set forth in NYSDOT Standard Specification Section 698.

D. **Quantity**. The quantity of fuel in gallons considered for adjustment will be determined by invoices for fuel delivered to the Project site. Quantities of fuel will be measured to the nearest 0.01 gallon.

E. **Adjustment**. Fuel price adjustment will be based on the following formulas:

1. When price increases: Price Adjustment = (Quantity of Fuel) x (Monthly Average Posted Price - Fuel Index Price - $0.10)

2. When price decreases: Price Adjustment = (Quantity of Fuel) x (Monthly Average Posted Price - Fuel Index Price + $0.10)

F. **Payment of the Price Adjustment.** The Contractor is required to keep a log of all fuel incorporated into the Project that is eligible for the price adjustment. The log must keep track of the date when the fuel was purchased, the quantity of the fuel, the Fuel Index Price and the Monthly Average Posted Price, as determined in accordance with 1.6.C.

1. When the adjustment amount, calculated in accordance with 1.6.E, exceeds $10,000.00 for all eligible fuel delivered to the Project site, the Contractor must submit with its monthly payment requisition, the request for payment of the fuel price adjustment.

1.7 STEEL PRICE ADJUSTMENT

A. **Applicability**. The intent of the steel price adjustment is to cover steel materials as follows. For the purposes of this section, steel includes all steel alloys, stainless steel alloys, iron, and ductile iron.

1. Steel price adjustment will apply to groups of similar material content ("Material Groups") within a specification section (e.g., structural steel shapes under 05 21 00 - STRUCTURAL STEEL FRAMING or reinforcing bars under 03 20 00 - CONCRETE REINFORCING).

2. The steel price adjustment will apply to the following Material Groups:
   a. Structural steel and joists
   b. Reinforcing bars
   c. Steel deck pans
   d. Cold formed steel framing and trusses
   e. Stair stringers and pans
   f. Steel dunnage for equipment
   g. Steel piling
   h. Drainage, water, and electrical piping and tubing
   i. Steel doors
   j. Municipal steel and iron castings (manhole covers, sewer grates, etc.)

3. The steel price adjustment will not apply to the following:
   a. Steel in fabricated elements, such as HVAC chillers or electrical fixtures and boxes
   b. Handrails, access ladders, and other miscellaneous metals
   c. Anchor bolts and fasteners

B. For each Material Group listed, the Contractor must also identify the parties whose relationship establishes the invoice date. If the parties are known, they must be identified by name. If the two parties are not

known, they must be identified by role (Contractor, Subcontractor, Materialman, fabricator, etc.). Different parties may be identified for scopes within a Material Group for the purposes of establishing an invoice date. If the Contractor does not provide a list of materials to which to apply the steel price adjustment, no steel price adjustment will be made.

C. If the percentage change for a given month does not exceed 5% plus or minus, from the benchmark steel index, no adjustments will be made for materials invoiced that month.

D. The percentage change for each material group identified in Article 1.7.A.2 above will be determined using the month that the largest value of materials were invoiced.

E. The weight of the steel must exclude minor appurtenances individually weighing less than 5 lbs (i.e., nuts, bolts, washers, etc.) and non-steel components, such as door insulation or glazing. Precast or prestressed concrete items must have total reinforcing steel weight listed on the approved shop drawings. The following sources must be used, in declining order of precedence, to determine the weight of steel: approved shop drawings; verified shipping documents; Contract Documents; industry standards (i.e., AISC Manual of Steel Construction, AWWA Standards, etc.); and manufacturer's data.

1. **Indexes and Prices**. Adjustments are based on the Producer Price Index (PPI) for Semifinished Steel Mill Products (WPU 101702). PPI values are published by the US Department of Labor, Bureau of Labor Statistics (BLS). Recent PPI values are posted on the NYSDOT website linked above. The Cost Basis, Benchmark Steel Index, Monthly Steel Index, and the Percentage Change are defined as follows:

   a. **Cost Basis (CB).** An average price of steel products in dollars per ton used solely as a cost basis from which to compute steel price adjustments. The cost basis for original Contract bid price items and additional work at the original Contract bid price will be the cost basis listed for the month of the bid letting. The cost basis for additional work at agreed price will be the value of the cost basis for the month the agreed price was submitted to the Commissioner.
   b. **Benchmark Steel Index (BI).** The benchmark steel index for original Contract bid price items and additional work at the original Contract bid price will be the value of the preliminary PPI for the month of the bid letting. The benchmark steel index for additional work at agreed price will be the value of the preliminary PPI for the month the agreed price was submitted to the Commissioner.
   c. **Monthly Steel Index (MI)**. Value of the final PPI for the month the material is invoiced.
   d. **Percent Change**. The percent change in any given month will be determined as follows:

$$Percentage\ Change = \left(\frac{MI - BI}{BI} \right) x\ 100$$

F. The quantity of steel for adjustment of each Material Group will be measured to the nearest 0.1 tons.

1. **Percent Change Greater Than +5%**. If the Percentage Change is greater than +5% from the benchmark steel index, Price Adjustments will be made for materials invoiced that month. The Contractor must provide the Commissioner a detailed list of the weight of eligible materials within 60 calendar days after installation, including: the Contract pay item, the weight of steel, the month(s) of invoice, the source used to determine the weight, and if requested by the Commissioner, copies of invoices to verify the month of invoice.

2. **Percent Change -5% to +5%.** If the Percentage Change is between -5% and +5%, inclusive, from the benchmark steel index, no adjustments will be made for materials invoiced that month.

3. **Percent Change Lower Than -5%.** If the Percentage Change is lower than -5% from the benchmark steel index, a Price Adjustment will be charged to the Contractor for materials invoiced that month. The Contractor must provide the Commissioner a detailed list of the weight of eligible materials within 60 calendar days after installation, including: the Contract pay item, the weight of steel, the month(s) of invoice, the source used to determine the weight, and copies of invoices to verify the month of invoice.

G. **Adjustment.** Steel price adjustment will be made for all the materials which the Contractor opted to apply the steel price adjustment, based on the following formulas:

1. When price increases:

$$Price\ Adjustment = \left[\left(\frac{MI - BI}{BI}\right) - 0.05\right](CB)\,Qty$$

2. When price decreases:

$$Price\ Adjustment = -\left[\left(\frac{MI - BI}{BI}\right) + 0.05\right](CB)\,Qty$$

H. **Payment of the Price Adjustment.** Steel Price Adjustment will be paid once during the Project duration for each eligible Material Group after the final PPI is available to set the Monthly Steel Index for the invoice month determined in Article 1.7.D above.

1.8 MEASUREMENT AND PAYMENT

A. The fixed sum shown in the Bid Breakdown or Bid Schedule for Price Adjustments Allowance will be considered the price bid for this item. The fixed sum is not to be altered in any manner by the bidder. Should the amount shown be altered, the new figures will be disregarded and the original price will be used to determine the total amount bid for the Contract. The fixed sum payment made under this item will be equal to the sum of payments and credits for price adjustments, as approved by the Commissioner, with no markup for overhead, profit, or other fees allowed. The fixed sum amount is included in the bid solely to ensure that sufficient monies will be available to pay the Contractor for the price escalation adjustment payments as delineated herein, which may be more or less than the fixed sum amount.

PART II - PRODUCTS (Not Used)

PART III - EXECUTION (Not Used)

END OF SECTION 01 21 00.10

SECTION 01 21 00.20

EXPANDED WORK ALLOWANCE

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 21 00.20

PART I - GENERAL

1.1 PURPOSE

A. The total amount of the Contract will include an allowance ("Expanded Work Allowance" or "EWA") such that, subject to compliance with the terms of this Contract, can be used for the items set forth in sub-section 1.4 below (said items will be referred to as the "Expanded Work Items" and this Specification will be referred to as the "EWA Specification"). Payment for the Expanded Work Items may only be made through the EWA in accordance with this EWA Specification. Except as specifically provided in this EWA Specification, nothing in this Section alters, or will be deemed to alter, the interpretation or application of, the Standard Construction Contract, including but not limited to Articles 21, 24, 25, 26, 28, and 78 thereof.

1.2 DEFINITIONS

A. Capitalized terms not otherwise defined in this EWA Specification will have the meaning ascribed to them in the Standard Construction Contract.

1.3 PROCESS

A. Except for those provisions specifically applicable to Expanded Work Items, all other provisions of the Contract applicable to Work will be applicable to Expanded Work Items To be eligible for the EWA, all work must be authorized in conformance with this EWA Specification and payment for the Expanded Work Items will not be made without written authorization as set forth in this EWA Specification. This EWA Specification must not be used to make interim payment for work that is being progressed as disputed Work.

B. The EWA may be utilized only under the conditions set forth in this EWA Specification.

C. The Contractor may request that identified Extra Work be subject to the EWA. If the Commissioner determines that use of the EWA is appropriate, in their sole discretion, the Commissioner will prepare a written scope document for the Expanded Work Items for the Contractor's execution ("EWA Scope Memo"). Upon EAO approval, the Commissioner will issue a Notice of Direction ("NOD") to proceed under the EWA Scope Memo. The EWA Scope Memo will set forth the maximum amount payable from the EWA ("Maximum Amount") prior to the issuance of a final cost memorandum, in accordance with this Section. The Maximum Amount may be increased from time to time by the Commissioner, in their sole discretion, except that the Maximum Amount may not exceed 80% of the Commissioner's estimated total cost for such Work (the "Estimated Cost") unless and until a final cost and scope is determined and a final cost memorandum ("Final Cost Memo") is executed in accordance with this Section.

D. Neither the Maximum Amount nor the Estimated Cost will be deemed to be the final cost of the Expanded Work Items. The final cost for the Expanded Work Items will be determined in accordance with Article 26 of the Standard Construction Contract as if the Expanded Work Items were Extra Work. The Contractor must submit its detailed price proposal for the Expanded Work Items, calculated in accordance with the Contract, within the time period set forth in the EWA Scope Memo or within 90 Days after the executed EWA Scope Memo is issued to the Contractor, whichever is sooner ("Submission Period").

E. Once the EWA Scope Memo is executed and the Contractor is issued an NOD to proceed with the Work, DDC will make progress payments for completed work under the EWA Scope Memo, as provided in the Contract, up to the Maximum Amount.

F. DDC will not make any progress payments for the performance of the Expanded Work Items beyond the Submission Period set forth in sub-Section D, above, unless and until a final cost and scope has been determined and a Final Cost Memo executed in accordance with this Section. No amounts above the Maximum Amount will be payable from the EWA, unless and until a final cost and scope has been determined and a Final Cost Memo executed in accordance with this Section. In all events, the Contractor must promptly and diligently comply with the Commissioner's direction and perform all Work required by the Contract and the EWA Scope Memo.

G. Upon receipt of the Contractor's cost detailed proposal, the Commissioner will evaluate the proposal and initiate negotiations, as necessary, to determine the final cost of the Expanded Work Items in accordance with Article 26 of the Standard Construction Contract as if the Expanded Work Items were Extra Work. The Contractor is responsible to furnish time and material records in accordance with Article 28 of the Standard Construction Contract until a Final Cost Memo is executed. If the parties cannot agree on a unit price or fixed price, the Contractor will be paid on the basis of time and material records in accordance with Article 26 the Standard Construction Contract as if the Expanded Work Items were Extra Work, subject to the provisions of Article 28 of the Contract.

H. A Final Cost Memo will be prepared by the Commissioner to be executed by the parties. The total net sum of the amounts added and/or credited under the EWA Scope Memo and payment of the finalized Final Cost Memo constitutes full accord and satisfaction for the costs resulting from the Expanded Work Items. In the event the EWA is insufficient to pay the full amount of the Final Cost Memo, the parties agree to execute change order documents for the remaining funds, subject to registration in accordance with the New York City Charter.

I. Upon EAO approval, the Resident Engineer or Project Manager has the power to execute the Final Cost Memo on behalf of the Commissioner. The description of the work described in the Final Cost Memo shall be considered to be included in the description of the Work as if it were fully set out in the Contract Documents and the Contractor shall perform the Work necessary to complete the Expanded Work Items in the same manner and under the same terms as any other Work described in the Contract Documents.

J. All payments for EWA work will be billed with other Contract Work and paid pursuant to Article 42 of the Standard Construction Contract.

K. No payment will be made for incomplete items included in the EWA Scope Memo and/or the Final Cost Memo.

1.4 WORK ELIGIBLE FOR AN EXPANDED WORK ALLOWANCE

A. Only the items set forth below will be eligible for consideration by the Commissioner for payment using the EWA:

1. Non-material changes in the Work necessary to complete Contract Work due to the following:

   a. Site conditions that significantly differ from those included in the Contract Documents and that could not have been anticipated by the Contractor (excluding pollution remediation).

   b. Overruns of unit price items and quantity increases in accordance with Article 26.

   c. NYCDOT traffic stipulations or permit requirements required for the operation of the construction

site that significantly differ from those included in the Contract Documents and that could not have been anticipated by the Contractor.

d. Changes to the sizes of materials or changes to specifications of materials from those provided in the Contract Documents that are approved by the Commissioner.

2. Non-material changes in the scope of Work directed by the Commissioner that result in a net change in the cost to the Contractor for the Work to be performed under this Contract, including, but not limited to, the following:

a. Increased costs of operation and maintenance of the Site due to changed site conditions or environmental hazards at the Site materially differing from any shown on the Contract Drawings or indicated in the Specifications or such conditions or environmental hazards as could not reasonably have been anticipated by the Contractor, which conditions or hazards will materially affect the cost of the Work to be done under the Contract. The attention of the Commissioner must be called immediately to such conditions or hazards before they are disturbed in accordance with Article 78.2 of the Standard Construction Contract.

b. Construction methodology changes issued in writing by the Commissioner.

c. Changes as a result of newly available technology that became available and/or approved for use by the City after the bidding opening was complete.

d. Safety enhancements not regulated or beyond Law.

e. Additional work to address non-regulatory changes in Agency or City policy.

f. The following administrative/regulatory non-material scope changes after Bid submission:

1) Changes to applicable federal, state and local laws, rules, ordinance, regulations, or requirements of the local authority having jurisdiction, including:

a) FDNY regulatory requirements that result in revisions or upgrades to existing standpipes, fire alarm systems, hydrants, pre-combustion gas compressors, or sprinkler systems that are not provided in the Contract Documents.

b) Changes to DOB regulatory requirements.

c) Changes to DEP and NYS DEC regulatory requirements.

d) Additions due to Local Law 94 of 2019 with respect to sustainable roof.

e) Public Design Commission regulatory requirements resulting in change in material/structure to match overall site scheme.

f) Addition of bypasses/shut off valves to avoid interruption of service to adjacent jurisdictions or neighborhoods.

2) Changes due to utility company requests.

1.5 WORK NOT ELIGIBLE FOR EWA

A. Items not specifically numerated in sub-section 1.4 are ineligible for EWA.

B. Notwithstanding anything in sub-section 1.4, the following work is not eligible for EWA:

1. Costs related to design errors and/or omissions.

2. Costs related to pollution remediation.

3. Costs associated with the purchase of standalone equipment.

4. Costs for initial outfitting.

1.6 BASIS OF PAYMENT

A. Eligible EWA payments will be made under the Allowance section of the PASSPort Item Grid titled “Allowance for Expanded Work.” The Contractor will only be entitled to payment from the EWA under the conditions and in accordance with the requirements set forth in this EWA Specification. In the event the EWA amount or any portion thereof remains unexpended at the conclusion of the Contract, such as amount will remain the sole property of the City.

B. The fixed sum must be considered the price bid for this item. The fixed sum is not to be altered in any manner by the bidder. Should the amount shown be altered, the new figures will be disregarded, and the original price will be used to determine the total amount bid for the contract.

C. The payment(s) made under this item will be equal to the Final Cost Memo prepared by the Commissioner and executed by the parties in accordance with sub-section 1.2(H) above as proof of work performed for this item as approved by the Commissioner.

D. The total estimated cost of this item is the "fixed sum" amount shown for this item and must not be varied in the bid. The "fixed sum" amount is included in the bid solely to ensure that sufficient monies will be available to pay the Contractor for this work, which may be more or less than the fixed sum amount.

E. The price will cover the cost of all labor, materials, equipment, insurance, and incidentals necessary to complete the work under this section in accordance with the Contract Drawings, the specifications, and the directions of the Commissioner.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 21 00.20

SECTION 01 21 00.30

PROJECT WORK ACCELERATION ALLOWANCE

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 21 00.30

PART I - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) City of New York Standard Construction Contract.

1.2 SUMMARY

A. This Section includes:

1. Accelerated Project Work

1.3 INTENT

A. Under this Allowance, the Contractor will be paid for Work deemed necessary by the City to accelerate the Project work items during periods specified by the City. The use of this item will expire on the scheduled Substantial Completion date for the Project, or within the time to which such Substantial Completion date may be extended by the City.

B. Accelerated Project Work, as described below, will be paid for under this item in accordance with the requirements of Articles 25 and 26 of the City of New York Standard Construction Contract.

C. Payment made under this Allowance will cover the cost of all labor, materials, plant, equipment, insurance, and incidentals necessary to accelerate the Project Work as ordered by the Commissioner.

D. No guarantee is given that this Allowance will in fact be utilized in this Contract. The estimated allowance amount is included in the total bid solely to ensure a method of payment for any accelerated Project Work performed by the Contractor, when directed by the Commissioner.

1.4 ACCELERATED PROJECT WORK

A. The Accelerated Project Work Allowance may only be used to achieve a specific goal as directed by the Commissioner, such as reducing delays to the Project's critical path.

B. The Accelerated Project Work Allowance will not be utilized to accelerate the Project Work due to any delays caused by the Contractor. If the Project Work is delayed to Contractor's fault, the Contract must accelerate the Work at the Contractor's sole cost and expense.

C. The Commissioner will initiate all requests for Accelerated Project Work. The request will include the requested goal for the Accelerated Project Work.

1. The Contractor must prepare a Time Impact Analysis per the requirements of the applicable Project Schedules Section (01 32 16.10, 01 32 16.20, or 01 32 16.30) in order to determine the anticipated time savings for a specific use of Accelerated Project Work. The costs required for the Time Impact Analysis must be included in the prices bid for all work and will not be reimbursed under this Allowance.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 21 00.30

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART I GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 01 60 00 PRODUCT REQUIREMENTS for requirements for submitting comparable product submittals for products by named or unnamed manufacturers. (i.e., “or approved equal” products)

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor that are not required to meet other Project requirements but may offer advantage to Contractor. Substitutions for Convenience are not permitted.

B. A substitution is not an “or approved equal” or a product, material, equipment, or method of construction that meets the requirements of the Contract Documents. A substitution is a change to the Contract, which, upon approval, will result in a change order.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use form acceptable to the Commissioner.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.

b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by others that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with applicable codes and standards.
j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Commissioner's Action: If necessary, Commissioner will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Commissioner will notify Contractor of acceptance or rejection of proposed substitution within 10 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Commissioner's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Commissioner does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: The Contractor must investigate and document compatibility of proposed substitution with related products and materials. The Contractor must engage a qualified testing agency to perform compatibility tests recommended by manufacturers or the Commissioner. These investigations, documentation, and testing will be at the Contractor’s sole expense.

1.6 PROCEDURES

A. Change Orders: A substitution is a Contractor-initiated change order request. Before a substitution can be implemented, it must pass through two approval processes: substitution approval per Article 1.7 below, and change order approval. If the substitution receives approval, as part of the change order process, the Contractor may request that the Commissioner consider granting advanced authorization.

B. Coordination during preparation of substitution: The Contractor, when developing a substitution, must address the designer's objectives, environmental permit requirements and regulations, commitments made to the public to mitigate the impact of construction, and other such concerns.

C. Coordination during execution of substitution: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

D. Conditions: The Contractor must not base any bid process on the anticipated approval of a substitution and should recognize that any substitution may be rejected. The following terms and conditions apply to a substitution:

1. A substitution will only be considered after the contract is awarded.

2. A substitution applies only to the contract for which it was submitted. One substitution must not be submitted for multiple contracts. Approval or disapproval of a substitution on one contract does not guarantee approval or disapproval on another contract.

3. The substitution request becomes the property of the City and will contain no restrictions imposed by the Contractor on its use or disclosure. The City will have the right to use, duplicate, and disclose in whole or in part any data necessary for the utilization of the substitution. The City retains the right to utilize any accepted or rejected substitution or part thereof on any other project without any obligation to the Contractor.

4. When the Commissioner is in the process of making design and specification revisions and a Contractor submits a substitution with similar revisions, the Commissioner will reject the substitution.

5. A substitution will be considered only if reasonable, cost-effective options are not provided in the Contract Documents.

6. The Commissioner will be the sole judge as to whether a substitution qualifies for consideration and evaluation. The Commissioner may reject any substitution that requires excessive time or costs for design review, evaluation, and/or investigations. The Commissioner will be the sole judge in determining if the proposed substitution will result in a sufficient amount of direct or indirect cost savings to offset the City's effort to review the substitution.

7. A substitution must be consistent with DDC's design policies and basic design criteria, provide the same service life or more, facilitate economy of operations, ease of maintenance, and achieve the desired appearance and safety.

8. The simple elimination of work does not necessarily constitute a substitution, however, a substitution which introduces a simple material substitution, or elimination of work, may be considered if it is accompanied by a design change or change in the construction method. A simple material substitution which introduces a new material to DDC may be also considered.

9. The substitution must not be experimental in nature but will have been proven to the Commissioner's satisfaction under similar or acceptable conditions on another City contract or at another location acceptable to the Commissioner.

10. If the Commissioner requires any additional information to evaluate the substitution, this information must be provided in a timely manner. Unless otherwise mutually agreed upon, failure to do so will result in the rejection of the substitution. An incomplete or a poor-quality substitution which hinders the Commissioner's review may also result in the rejection of the substitution.

11. The Contractor must allow submissions of substitution from an approved Subcontractor, provided that reimbursement is made by the City to the Contractor and that the terms of payment to the Subcontractor are satisfactorily negotiated and accepted before the substitution is submitted to the Commissioner. Subcontractors may not submit a substitution except through the Contractor.

12. A substitution approved by the Commissioner will be a revision to the Contract Documents and progress schedule. Consequently, if unsatisfactory results are being achieved or adjustments are necessary during implementation of a substitution, the rejection of work, removal of work, addition of work, or revision of work must be evaluated in accordance with the Contract requirements.

13. No work related to a substitution will be performed under allowance items. Agreed prices must be reached for the substitution before the substitution is approved. If the Contractor is deemed to have taken reasonable diligence in determining the work involved but if during the construction of substitution work a significant change in the character of work occurs, the Commissioner may consider new agreed prices.

14. The Contractor will receive written notification from the Commissioner when the substitution is approved. Material orders placed prior to substitution approval are placed at the Contractor's risk.

15. Once a substitution has been approved, the substitution will then be submitted as a change order and processed accordingly. The Contractor is responsible for submitting all appropriate information to the Commissioner in a timely manner.

1.7 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 30 days prior to time required for preparation and review of related submittals.

1. Conditions: Commissioner will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Commissioner will return requests without action, except to record noncompliance with these requirements:

   a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   b. Substitution request is fully documented and properly submitted.
   c. Requested substitution will not adversely affect Contractor's construction schedule.
   d. Requested substitution has received necessary approvals of authorities having jurisdiction.
   e. Requested substitution is compatible with other portions of the Work.
   f. Requested substitution has been coordinated with other portions of the Work.
   g. Requested substitution provides specified warranty.
   h. If requested substitution involves more than one Subcontractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all Subcontractors involved.

B. Substitutions for Convenience: Not allowed.

PART II – PRODUCTS (Not Used)

PART III - EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 012900

PAYMENT PROCEDURES

PART I - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract]

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process payment requisitions.

B. Related Requirements:

1. Sections 01 32 16.10, 01 32 16.20, or 01 32 16.30 PROJECT SCHEDULES (METHOD A/B/C) for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's payment requisitions. The Schedule of Values serves as the Bid Breakdown on Lump Sum per Article 41 of the Standard Construction Contract.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's construction schedule per Sections 01 32 16.10, 01 32 16.20, or 01 32 16.30. If Section 01 32 16.30 is used and the Contractor’s Critical Path Method Schedule is cost loaded, it will serve as the Schedule of Values.

1. Coordinate line items in the Schedule of Values with items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the Schedule of Values to the Commissioner at earliest possible date and as required in Standard Construction Contract Article 41.1.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Arrange Schedule of Values consistent with format provided by the Commissioner.

2. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of payment request and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

3. Allowances and Unit Prices: Provide a separate line item in the Schedule of Values for each allowance and unit price item. Show line-item value of unit price items, as a product of the unit cost, multiplied by measured quantity.

4. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place, as separate line items.

5. Schedule of Values Revisions: Revise the Schedule of Values when Change Orders result in a change in the lump sum price. Include at least one separate line item for each Change Order.

1.5 PAYMENT REQUISITIONS

A. Each payment requisition following the initial mobilization payment requisition must be consistent with the previous requisitions and payments, as certified by the Commissioner. Each partial payment requisition must comply with the requirement of Article 42 of the Standard Construction Contract.

B. Payment Requisition Times: The Contractor must submit the payment requisition to the Commissioner by the end of the month following the payment period ("Due Date"). The period covered by each payment requisition is one month, ending on the last day of the month, unless a longer payment period is approved by the Commissioner.

1. The Contractor must submit a draft copy of the payment requisition seven days prior to Due Date for review by Commissioner.

C. Payment Requisition Forms: Use forms provided by the Commissioner as form for payment requisitions.

D. Payment Requisition Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Commissioner will return incomplete payment requisitions without action.

1. Entries shall match data on the Schedule of Values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous payment requisition, whether or not payment has been received. Include only amounts for work completed at time of payment requisition.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by requisition.

E. PARTIAL PAYMENTS FOR MATERIALS IN ADVANCE OF THEIR INCORPORATION IN THE WORK PURSUANT TO ARTICLE 42 OF THE CONTRACT – In order to better ensure the availability of materials, fixtures and equipment when needed for the work, the Commissioner may authorize partial payment for certain materials, fixtures and equipment, prior to their incorporation in the work, but only in strict accordance with, and subject to, all the terms and conditions set forth in the Specifications, unless an alternate method of payment is elsewhere provided in the Specifications for specified materials, fixtures or equipment.

1. The Contractor must submit to the Commissioner a written request, in quadruplicate, for payment for materials purchased or to be purchased for which the Contractor needs to be paid prior to their actual

incorporation in the work. The request must be accompanied by a schedule of the types and quantities of materials, and must state whether such materials are to be stored on or off the site.

2. Where the materials are to be stored off the site, they must be stored at a place within the continental United States other than the Contractor's premises (except with the written consent of the Commissioner) and under the conditions prescribed or approved by the Commissioner. The Contractor must set apart and separately store at the place or places of storage all materials and must clearly mark same "PROPERTY OF THE CITY OF NEW YORK", and further, must not at any time move any of said materials to another off-site place of storage without the prior written consent of the Commissioner. Materials may be removed from their place of storage off the site for incorporation in the work upon approval of the Commissioner.

3. Where the materials are to be stored at the site, they must be stored at such locations as will be designated by the Commissioner and only in such quantities as, in the opinion of the Commissioner, will not interfere with the proper performance of the Work by the Contractor or by other Subcontractors then engaged in performing work on the site. Such materials must not be removed from their place of storage on the site except for incorporation in the Work, without the approval of the Commissioner.

4. INSURANCE

   a. STORAGE OFF-SITE – Where the materials are stored off the site and until such time as they are incorporated in the Work, the Contractor must fully insure such materials against any and all risks of destruction, damage or loss including but not limited to fire, theft, and any other casualty or happening. The policy of insurance must be payable to the City of New York. It must be in such terms and amounts as must be approved by the Commissioner and must be placed with a company duly licensed to do business in the State of New York. The Contractor must deliver the original and one (1) copy of such policy or policies marked "Fully Paid" to the Commissioner.

   b. STORAGE ON THE SITE – Where the materials are stored at the site, the Contractor must furnish satisfactory evidence to the Commissioner that they are properly insured against loss, by endorsements or otherwise, under the policy or policies of insurance obtained by the Contractor to cover losses to materials owned or installed by the Contractor. The policy of insurance must cover fire and extended coverage against windstorm, hail, explosion and riot attending a strike, civil commotion, aircraft, vehicles and smoke.

5. All costs, charges and expenses arising out of the storage of such materials, must be paid by the Contractor and the City hereby reserves the right to retain out of any partial or final payment made under the Contract an amount sufficient to cover such costs, charges and expenses with the understanding that the City will have and may exercise any and all other remedies at law for the recovery of such cost, charges and expenses. There will be no increase in the Contract price for such costs, charges and expenses and the Contractor must not make any claim or demand for compensation therefore.

6. The Contractor must pay any and all costs of handling and delivery of materials, to the place of storage and from the place of storage to the site of the Work; and the City will have the right to retain from any partial or final payment an amount sufficient to cover the cost of such handling and delivery.

7. In the event that the whole or any part of these materials are lost, damaged, or destroyed in advance of their satisfactory incorporation in the work, the Contractor, at the Contractor's own cost, must replace such lost, damaged or destroyed materials of the same character and quality. The City will

reimburse the Contractor for the cost of the replaced materials to the extent, and only to the extent, of the funds actually received by the City under the policies of insurance hereinbefore referred to. Until such time as the materials are replaced, the City will deduct from the value of the stored materials or from any other money due under the Contract, the amount paid to the Contractor for such lost, damaged or destroyed materials.

8. Should any of the materials paid for the City hereunder be subsequently rejected or incorporated in the work in a manner or by a method not in accordance with the Contract Documents, the Contractor must remove and replace, at Contractor's own cost, such defective or improperly incorporated material with materials complying with the Contract Documents. Until such materials are replaced, the City will deduct from the value of the stored materials or from any other money due to the Contractor, the amount paid by the City for such rejected or improperly incorporated materials.

9. Payments for the cost of materials made hereunder will not be deemed to be an acceptance of such materials as being in accordance with the Contract Documents, and the Contractor always retains and must comply with the Contractor's duty to deliver to the site and properly incorporate in the work only materials which comply with the Contract Documents.

10. The Contractor must retain any and all risks in connection with the damage, destruction, or loss of the materials paid for hereunder to the time of delivery of the same to the site of the Work and their proper incorporation in the work in accordance with the Contract Documents.

11. The Contractor must comply with all laws and the regulations of any governmental body or agency pertaining to the priority purchase, allocation, and use of the materials.

12. When requesting payment for such materials, the Contractor must submit with the partial estimate duly authenticated documents of title, such as bills of sale, invoices or warehouse receipts, all in quadruplicate. The executed bills of sale must transfer title to the materials from the Contractor to the City. (In the event that the invoices state that the material has been purchased by a Subcontractor, bills of sale in quadruplicate will also be required transferring title to the materials from Subcontractor to the Contractor).

13. Where the Contractor, with the approval of the Commissioner, has purchased unusually large quantities of materials in order to assure their availability for the work, the Commissioner, at the Commissioner's option, may waive the requirements of Paragraph 12 provided the Contractor furnishes evidence in the form of an affidavit from the Contractor in quadruplicate, and such other proof as the Commissioner may require, that the Contractor is the sole owner of such materials and has purchased them free and clear of all liens and other encumbrances. In such event, the Contractor will pay for such materials and submit proof thereof, in the same manner as provided in Paragraph 12 hereof, within seven (7) days after receipt of payment therefore from the Comptroller. Failure on the part of the Contractor to submit satisfactory evidence that all such materials have been paid for in full, will preclude the Contractor from payments under the Contract.

14. The Contractor must include in each succeeding partial estimate requisition a summary of materials stored which must set forth the quantity and value of materials in storage, on or off the site, at the end of each preceding estimate period; the amount removed for incorporation in the Work; the quantity and value of materials delivered during the current period and the total value of materials on hand for which payment thereof will be included in the current payment estimate.

15. Upon proof to the satisfaction of the Commissioner of the actual cost of such materials and upon submission of proper proof of title as required under Paragraph 12 or Paragraph 13 hereof, payment will be made therefore to the extent of 85%, provided however, that the cost so verified, established

and approved must not exceed the estimated cost of such materials included in the approved detailed breakdown estimate submitted in accordance with Article 41 of the Contract; if it does, the City will pay only 85% approved estimated cost.

16. Upon the incorporation in the Work of any such materials, which have been paid for in advance of such incorporation in accordance with the foregoing provisions, payment will be made for such materials incorporated in the Work pursuant to Article 42 of the Contract, less any sums paid pursuant to Paragraph 15 herein.

F. Transmittal: Submit one signed and notarized electronic PDF copy of each payment requisition to **Commissioner** by email or as directed.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. MOBILIZATION PAYMENT – A line item for mobilization must be allowed on the Contractor's Detailed Bid Breakdown submitted in accordance with Article 41 of the Contract. The Mobilization Payments are intended to include the cost of required bonds, insurance coverage, and/or any other expenses required for the initiation of the Contract Work. All costs for mobilization will be deemed included in the total Contract Price. The Detailed Bid Breakdown must reflect, and the Mobilization Payment will be made, in accordance with the following schedule:

Contract Bid Amount	Initial Mobilization Payment	Remaining Mobilization Payment	Total Mobilization Payment (Initial Mobilization Payment + Remaining Mobilization Payment)
$0 - $10,000,000	1% of contract bid amount	7% of contract bid amount	8% of contract amount
$10,000,001 - $50,000,000	1% of contract bid amount	7% on the first $10,000,000 plus 3% of the contract bid amount greater than $10,000,000	8% on the first $10,000,000 plus 4% of contract amount greater than $10,000,000
Over $50,000,000	$500,000	$1,900,000	$2,400,000

1. Upon issuance of the Notice to Proceed, the Contractor may requisition for the Initial Mobilization Payment upon submission and approval of all required insurance certificates and bonds.

2. The Contractor may requisition for the Remaining Mobilization Payment upon satisfactory completion of the following items:

a. DDC approval of the Detailed Bid Breakdown per Article 41 of the Contract;

b. Selection and DDC approval of any required field office location(s);

c. Submission of all required insurance certificates and bond;

d. Approval of the Site Safety Plan per the Safety Requirements Section of the Information for Bidders;

e. Approval of the Progress Schedule;

f. Approval of the Schedule Submittal; and,

g. Submission of the Pre-Construction Photographs.

3. The Contractor will not be entitled to a Mobilization Payment that exceeds the Total Mobilization Payment specified in the chart above for the applicable Contract Bid Amount.

H. PAYMENT OF ALLOWANCES:

1. Unless otherwise called for in the Specifications, the following requirements apply to the payment and execution of Allowances established in the Contract:

a. Allowances are to be utilized when ordered and authorized in writing by the Commissioner.

b. The Contractor will be paid on a time and materials (T&M) basis under the Allowance, in accordance with the requirements of Standard Construction Contract Article 26.

I. Payment Requisition at Substantial Completion: Requestion for Substantial Completion Payment must be submitted in accordance with Article 44 of the Contract.

1. After Commissioner issues the Certificate of Substantial Completion, submit a payment requisition for Substantial Completion payment in compliance with Article 44 of the Contract.

2. Include documentation supporting that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

a. Complete administrative actions, submittals, and Work for Substantial Completion, as described in Section 01 77 00 CLOSEOUT PROCEDURES.

3. This payment requisition must reflect any Occupation or Use Prior to Completion per Article 16 of the Standard Construction Contract.

J. Final Payment Application: After completing Project closeout requirements, submit a payment requisition for Final Acceptance payment in compliance with Article 45 of the Contract.

1.6 PAYMENTS TO M/WBE SUBCONTRACTORS

A. The Department of Design and Construction ("DDC") is committed to supporting the growth and success of Minority and Women-owned Business Enterprises ("M/WBE"). In furtherance of this goal, DDC complies with NYC Administrative Code section 6-129, as amended. In order to support the growth and success of M/WBEs on all DDC projects, it is important that M/WBE vendors that are sub-contractors (any tiers) are treated fairly at all times and that their payment requisitions / invoices are handled in accordance with the City's Standard Construction Contract. Pursuant to the Standard Construction Contract, prime contractors are required to pay Subcontractors within thirty (30) days of receipt of such funds from DDC. Failure to comply with the Standard Construction Contract and the goals established by DDC as it applies to M/WBEs, may result in financial sanctions and negative performance evaluations, which will be taken into consideration on future procurements.

PART II - PRODUCTS (Not Used)

PART III - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

B. LEED: Refer to the Addendum to identify whether this Project is designed to comply with a Certification Level according to the U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED) Rating System, as specified in Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS.

C. COMMISSIONING: Refer to the Addendum to identify whether this Project will be commissioned by an independent third party under separate contract with the City of New York (City). Commissioning will be in accordance with ASHRAE and USGBC LEED-NC procedures, as described in Section 01 91 13, GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS, and/ or Section 01 91 15 GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE COMMISSIONING. The Contractor must cooperate with the commissioning agent and provide whatever assistance is required.

1.2 SUMMARY:

A. This Section includes administrative provisions for coordinating construction operations on the Project, including:

1. Coordination Drawings
2. Administrative and supervisory personnel
3. Project meetings
4. Requests for Interpretation (RFIs)

B. This Section includes the following:

1. Definitions
2. Coordination
3. Submittals
4. Project Meetings
5. Requests for Interpretation (RFI's)
6. Correspondence
7. Contractor's Daily Reports

C. Related Sections:

1. Section 01 10 00 SUMMARY
2. Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION
3. Section 01 33 00 SUBMITTALS
4. Section 01 35 26 SAFETY REQUIREMENTS
5. Section 01 73 00 EXECUTION REQUIREMENTS
6. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
7. Section 01 77 00 CLOSEOUT PROCEDURES

1.3 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: "Design Consultant" must mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.4 COORDINATION:

A. Coordination: The Contractor must coordinate its construction operations, including those of its Subcontractors, with other entities to ensure the efficient and orderly installation of each part of the Work. The Contractor must coordinate the various operations required by different Sections of the Specifications that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence in order to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum access for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and access for required maintenance, service, and repair of all components, including mechanical and electrical.

B. The Contractor must prepare memoranda for distribution to its Subcontractors and other involved entities, outlining special procedures required for coordination. Such memoranda must include required notices, reports, and meeting minutes as applicable.

C. Administrative Procedures: The Contractor must coordinate scheduling and timing of required administrative procedures with other construction activities and activities of its Subcontractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include without limitation the following:

1. Preparation of Contractor's Construction Schedule.
2. Installation and removal of temporary facilities and controls.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Pre-installation conferences.
6. Startup and adjustment of systems.
7. Project closeout activities.

D. Conservation: The Contractor must coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

E. Salvaged Items, Material and/or Equipment: The Specifications may identify certain items, materials or equipment which must be salvaged by the Contractor and handled or disposed of as directed. The Contractor must comply with all directions in the Specifications regarding the salvaging and handling of identified items, material or equipment.

F. Software: The Contractor may be required by the Commissioner to utilize a designated cloud-based Construction Management Tool to streamline and manage activities, including but not limited to the following:
   1. Submittals;
   2. Drawings, Specifications, and Bulletins;
   3. RFI's;
   4. Progress Photographs;
   5. Letters and Correspondence;
   6. Punchlists and Closeout Management;
   7. Daily Logs;
   8. Meetings and Minutes; and/or,
   9. Change Order log memos.

1.5 SUBMITTALS:

A. Submit shop drawings, product data, samples etc., in compliance with Section 01 33 00 SUBMITTAL PROCEDURES.

B. Coordination Drawings: The Contractor must prepare applicable Coordination Drawings in compliance with the requirements for Coordination Drawings in Section 01 33 00 SUBMITTAL PROCEDURES.

C. Safety Plan in compliance with Section 01 35 26 SAFETY REQUIREMENTS PROCEDURES.

D. Waste Management Plan in compliance with Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

E. Key Personnel Names: Within fifteen (15) Days after the Notice to Proceed (NTP), the Contractor must submit a list of key personnel assignments of the Contractor and its Subcontractors, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in case of the absence of individuals assigned to Project.

   1. Post copies of the list in Project meeting room, in temporary field office, and by each temporary telephone. Keep the list current at all times.

   2. In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work. Include special personnel required for coordinating all operations by its Subcontractors.

1.6 PROJECT MEETINGS:

A. General: The Commissioner will hold regularly scheduled construction progress meetings at the site, at which time the Contractor and appropriate Subcontractors must have their representatives present to discuss all details relative to the execution of the work. The Commissioner will preside over these meetings.

   1. Agenda: Prior to each meeting, the Commissioner will consult with the Contractor and will prepare an agenda of items to be discussed. In general, after informal discussion of any item on the agenda, the Commissioner will summarize the discussion in a brief written statement, and the Contractor will then dictate a brief statement for the record.

   2. Coordination: In addition to construction progress meetings called by the Commissioner, the Contractor must hold regularly scheduled meetings for the purpose of coordinating, expediting and scheduling the work in accordance with the master coordinated Job Progress Chart. The Contractor and its Subcontractors, material suppliers or vendors whose presence is necessary, are required

to attend. These meetings may, at the discretion of the Contractor, be held at the same place and immediately following the Project meetings held by the Commissioner. Minutes of these meetings must be recorded, typed and printed by the Contractor and distributed to all parties concerned.

B. Preconstruction Kick-Off Meeting:

1. The Commissioner will schedule a preconstruction kick-off meeting either at DDC's main office or at the Project site to review responsibilities and personnel assignments and clarify the role of each participant. Unless otherwise directed, the Design Consultant will record and distribute meeting minutes.
2. Attendees: Authorized representative of the Sponsor Agency; Design Consultant; the Contractor and its superintendents, Subcontractor(s) and their superintendent(s); LEED sub-consultant and Commissioning Authority /Agent (CxA) as applicable and other concerned parties. All participants at the meeting must be familiar with the Project and authorized to conclude matters relating to the Contract Work.
3. Agenda: Includes without limitation the following as applicable:
   a. Establishing construction schedule;
   b. Schedule for regular construction meetings;
   c. Phasing;
   d. Critical Work sequencing and long-lead items;
   e. Designation of key personnel and their duties;
   f. Reviewing application for payment and change order procedures;
   g. Procedures for RFIs;
   h. Review permits and approval requirements;
   i. Review all recent administrative code reporting requirements relating to the Project, (i.e. LL 77, LL86 etc.);
   j. Procedures for testing and inspecting;
   k. Reviewing special conditions at the Project site;
   l. Distribution of the Contract Documents;
   m. Submittal procedures;
   n. Safety procedures;
   o. LEED requirements;
   p. Commissioning requirements;
   q. Preparation of record documents;
   r. Historic Treatment requirements;
   s. Use of the premises;
   t. Work restrictions;
   u. Sponsor Agency occupancy requirements;
   v. Responsibility for temporary facilities, services, and controls;
   w. Construction Waste Management and Disposal;
   x. Indoor Air Quality Management Plan;
   y. Dust Mitigation Plan;
   z. Office, work, and storage areas;
   aa. Equipment deliveries and priorities;
   bb. Security;

cc. Progress cleaning; and,

dd. Working hours;

C. Construction Progress Meetings:

1. The Commissioner will schedule and conduct construction progress meetings at bi-weekly intervals or as otherwise determined. All participants at the meeting must be familiar with the Project and authorized to conclude matters relating to the Work. Unless otherwise directed, the Design Consultant will record and distribute meeting minutes.
2. Attendees:
   a. Design Consultant and applicable sub-consultants;
   b. Sponsor Agency Representative;
   c. Representatives from the Contractor, sub-contractor(s), suppliers or other entities involved in the current progress, planning, coordination or future activities of the Work; and,
   d. Other appropriate DDC personnel, DDC consultants and concerned parties.
3. Agenda: Includes without limitation the following:
   a. Review the Construction Schedule and progress of the Work. Determine if the Work is on time, ahead of schedule or behind schedule. Determine actions to be taken to maintain or accelerate the schedule;
   b. Review and approve prior meeting minutes and follow up open issues;
   c. Coordinate work between each Subcontractor;
   d. Sequence of Operations;
   e. Status of submittals, deliveries, and off-site fabrication;
   f. Status of inspections and approvals by governing agencies;
   g. Temporary facilities and controls;
   h. Review Site Safety;
   i. Quality and work standards;
   j. Field observations;
   k. Status of correction of deficient items;
   l. RFI's;
   m. Pending changes;
   n. Status of outstanding payments and change orders;
   o. LEED requirements including Construction Waste Management, Indoor Air Quality Plan, Dust Mitigation and Commissioning; and,
   p. Status of Administrative Code reporting requirements related to the Project.

D. Preinstallation Conferences:

1. The Contractor will conduct a preinstallation conference at project site before each construction activity when required by other specification Sections and when required for coordination with other construction.
2. Attendees:
   a. Contractor and its superintendents
   b. Applicable Subcontractor(s)
   c. Representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will

follow.

3. Advise the Commissioner of scheduled preinstallation conference meeting dates.
4. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   a. Contract Documents
   b. Related RFI's
   c. Deliveries
   d. Submittals
   e. Review of mockups
   f. Possible conflicts
   g. Compatibility requirements
   h. Time schedules
   i. Weather limitations
   j. Manufacturer's written instructions
   k. Warranty requirements
   l. Compatibility of materials
   m. Acceptability of substrates
   n. Temporary facilities and controls
   o. Space and access limitations
   p. Testing and inspecting requirements
   q. Installation procedures
   r. Coordination with other work
   s. Required performance results
   t. Protection of adjacent work

1.7 REQUESTS FOR INFORMATION (RFI):

A. Procedure: Immediately on discovery of the need for information or interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, the Contractor must prepare and submit an RFI in the form specified by the Commissioner.

1. RFI must originate with the Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2. Coordinate and submit RFI in a prompt manner to the Commissioner so as to avoid delays in Contractor's Work or Work of its Subcontractors.
3. RFI Log: The Contractor must prepare, maintain, and submit a tabular log of RFIs organized by the RFI number monthly to the Commissioner, or more frequently if directed by the Commissioner.
4. On receipt of responses and action to the RFI, the Contractor must update the RFI log and immediately distribute the RFI response to affected parties. Review response(s) and notify the Commissioner immediately if the Contractor disagrees with response(s).

1.8 CORRESPONDENCE:

A. Copies of all correspondence to DDC must be sent directly to the Commissioner at the job site.

1.9 CONTRACTOR'S DAILY REPORTS:

A. The Contractor must prepare and submit Daily Construction Progress Reports as outlined in Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required Work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for establishing an effective base line schedule for the Project and documenting the progress of construction during performance of the Work by developing and revising as necessary, various documents including but not limited to the following:
1. Submittals schedule
2. Daily construction reports
3. Material location reports
4. Field condition reports
5. Special reports

B. RELATED SECTIONS:

1.	Section 01 10 00	SUMMARY
2.	Section 01 32 22	PHOTOGRAPHIC DOCUMENTATION
3.	Section 01 32 16.10	PROJECT SCHEDULES (METHOD A)
4.	Section 01 32 16.20	PROJECT SCHEDULES (METHOD B)
5.	Section 01 32 16.30	PROJECT SCHEDULES (METHOD C)
6.	Section 01 33 00	SUBMITTAL PROCEDURES
7.	Section 01 40 00	QUALITY REQUIREMENTS

1.3 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: “Design Consultant” must mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the “Design Consultant” may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

PART II – PRODUCTS

2.1 SUBMITTALS SCHEDULE:

A. Preparation: The Contractor must submit a schedule of submittals, arranged in chronological order by dates required by the construction schedule. Include time required for review, re-submittal, ordering, manufacturing, fabrication, and delivery when establishing dates. The Submittals Schedule must show all of the following types of submittals:

1. Shop and Coordination Drawings
2. Material Samples
3. Catalog Cuts
4. Test and Evaluation Reports
5. Field Test Reports
6. Sample Warranties
7. Certificates
8. Qualification Data
9. Closeout Submittals

B. Submittals: At the kick-off meeting, the Contractor must have a preliminary Submittals Schedule, and must review this Schedule with the Commissioner. Within ten (10) Days after the kick-off meeting, the Contractor must complete the Submittals Schedule, including all submission dates, required delivery dates, and fabrication times. The Contractor must include an updated Submittals Schedule with all Progress Payment applications.

C. Review: The Commissioner will review the Submittals Schedule submitted by the Contractor. Upon acceptance, the Commissioner will date and sign the schedule as approved and transmit it to the Design Consultant, Contractor, and others within DDC as the Commissioner deems appropriate. If so directed by the Commissioner, the Contractor must revise the Submittals Schedule to indicate a submission date for specified shop drawings and/or material samples within sixty (60) Days after the kick-off meeting. The Contractor must resubmit the Submittals Schedule as necessary to include all review comments.

2.2 REPORTS:

A. Daily Construction Reports: The Contractor must submit to the Commissioner written Daily Construction Reports at the end of each day that work was performed, recording basic information such as the date, day, weather conditions, and contract days passed, remaining contract duration/days and the following information concerning the Project.

Information: The reports must be prepared by the Contractor's Superintendent and must bear the Contractor's Superintendent's signature. Each report must contain the following information:

1. List name of Contractor, Subcontractors, their work force in each category, and details of activities performed;
2. The type of materials and/or major equipment being installed by the Contractor and/or by each Subcontractor;
3. The major construction equipment being used by the Contractor and/or Subcontractors;
4. Material and Equipment deliveries;
5. High and low temperatures and general weather conditions;
6. Accidents;
7. Meetings and significant decisions;
8. Unusual events;
9. Stoppages, delays, shortages, and losses;
10. Meter readings and similar recordings;
11. Emergency procedures;

12. Orders and/or requests of authorities having jurisdiction;
13. Approved Change Orders received and implemented;
14. Field Orders and Directives received and implemented;
15. Services connected and disconnected;
16. Equipment or system tests and startups;
17. Digital photographs (cell phone quality, 5 megapixel minimum) of the work being performed, and of any issues;
18. Partial Completion(s) and occupancies; and,
19. Substantial Completion(s) authorized;

NOTE: If there is NO ACTIVITY at site, a daily report indicating so and the reason for no activity at the site must be submitted.

B. Material Location Reports: The Contractor must submit a Material Location Report at weekly OR monthly intervals as determined and established by the Commissioner. Such report must include a comprehensive list of materials delivered to and stored at Project site. List must be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit a Request For Information (RFI) form with a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.3 SPECIAL REPORTS:

A. Accident report, incident report, special condition report for the conditions out of control of any party involved with the Project effecting Project progress, explaining impact on the Project schedule and cost if any.

PART III – EXECUTION (Not Used)

END OF SECTION 01 32 00

SECTION 01 32 16.10
PROJECT SCHEDULES (METHOD A)

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 32 16.10

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes the following:

1. Methods
2. Definitions
3. Preliminary, Baseline, and Project Schedule Preparation Timeline
4. Preliminary Project Schedule Development
5. Project Schedule
6. Activity and Calendar Coding Structure
7. Work Breakdown Structure (WBS)
8. Major Milestones
9. Short (Three-Week) Interval/Two-Week Look-Ahead
10. Submittals
11. Project Schedule Updating
12. Time Impact Analysis

1.3 METHODS:

A. The Contractor must comply with Project schedule development and updating requirements as specified herein.

1. The Contractor must employ or retain the services of a Construction Scheduler with verifiable construction scheduling experience, subject to review and acceptance by the City. Upon request, the Contractor must provide the City with details of qualifications and experience of the proposed scheduling staff member(s).

2. The Contractor must prepare, update, and maintain a detailed Project Schedule using a version of scheduling software that is compatible with the City's Oracle Primavera P6 Enterprise Project Portfolio Management (EPPM). All schedule submittals must be developed using Oracle's Primavera P6 EPPM software. Schedules must be developed using accepted CPM techniques using the precedence diagramming method (PDM). The Project Schedule must be developed following Defense Contract Management Agency (DCMA) and American Association of Cost Engineering International (AACE International) guidance. The Contractor will be required to use the Contractor's

own P6 license (whether single-user or Enterprise license), unless otherwise directed by the Commissioner. If directed by the Commissioner prior to the Notice to Proceed (NTP), the Contractor must use the Department's P6 Enterprise license and develop the Progress Schedule within the Department's Enterprise environment.

3. Once the Baseline Schedule is accepted by the City, progress updates to the Project Schedule must be submitted monthly, unless otherwise directed by the City, until Substantial Completion. The Data Date for the schedule updates must use the last Friday of the month, or as directed by the City.

4. The Contractor will be responsible for providing the monthly schedule updates once the Baseline Schedule is approved. Each monthly schedule update must be accompanied with a schedule narrative that explains the following:

   a. The progress of work during that particular period of performance,
   b. Any changes in schedule Logic,
   c. The physical conditions that were used to update every Activities Percent Complete,
   d. Any change in actual Start and Finish Dates,
   e. Any Duration changes,
   f. Any added and deleted Activities, and
   g. Any added Extra Work (e.g. change orders).

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	**Definition**
Activity	A representation of a discrete portion of the overall scope of Work or an event through Duration and description in a CPM schedule.
Baseline Schedule	The planned and detailed CPM schedule of Activities, including all Logic, Durations, Resource and Cost Loading, and showing the entire scope of Work. The Baseline Schedule must be accepted by the City.
Critical Path	The longest sequence of Activities in a network which establishes the minimum length of time for accomplishment of the end event of the Project.
Critical Path Method (CPM)	A management technique used to plan and control a Project which combines all relevant information into a single plan defining the sequence and Duration of operations and depicting the interrelationship of the Work elements required to complete the Project.
Current Schedule	The most recently updated schedule that captures progress to date and forecasts the dates for each Activity.
Data Date	The date used as a starting point for scheduling calculations. The Data Date is changed to the current end of period date when a schedule is updated for progress.
Duration	The amount of time, in workdays, an Activity will take to perform.

Term	Definition
Finish Date	The earliest estimated date an Activity is calculated to be complete, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.
Free Float	The calculated amount of time that the estimated start or finish of an Activity can be delayed without impacting the start or finish of other downstream Activities logically connected in a progressive relationship. (See Finish Date and Late Finish).
Fragnet	Fragmentary network: a portion of a schedule detailing impacts of an event on specific Activities in the broader schedule.
Inclement Weather	Any weather condition, the duration of which varies in excess of the 3-year average published by the National Oceanic and Atmospheric Administration (NOAA) information for the local area.
Integrated Project Schedule	The Commissioner's overall schedule covering design, procurement and construction. The Commissioner will use the Contractor's Project Schedule to update the Integrated Project Schedule.
Late Finish	An estimate of the latest plausible date an Activity's completion can be postponed without rendering as unachievable the required completion of any downstream Milestones to which the Activity is Logically connected to in a progressive relationship.
Late Start	An estimate of the latest plausible date an Activity's start can be postponed without rendering as unachievable the required completion of any downstream Milestones to which the Activity is Logically connected to in a progressive relationship.
Logic	A direct progressive relationship between Activities where one Activity's performance restricts the performance of another Activity.
Milestone	A key or critical point in time for reference or measurement.
Network Diagram	A graphic diagram of a network schedule, showing Activities and Activity relationships.
Original Duration	The estimated amount of time, in Work Days, an Activity is expected to take to complete at the beginning of a Project as anticipated by the Contractor based on its planned means and methods at time of bid and documented in the Baseline Schedule.
Percent Complete	The percentage of the scope of Work represented by an Activity completed as of the Data Date calculated as physical percent complete for payment purposes.
Project Schedule	The Contractor's schedule used to manage the orderly and expeditious completion of the Work. The Project Schedule is initially the accepted Baseline Schedule, and is updated throughout the Project.
Remaining Duration	The amount of time, in Work Days, the remaining scope of Work represented by an Activity is expected to take to complete, measured from the current Data Date.

Term	Definition
Resource and Cost Loading	Values assigned for estimated dollars, manpower, equipment and/or materials necessary to complete the scope of Work represented by a specific Activity.
Recovery Schedule	A Recovery Schedule outlining and incorporating extraordinary efforts required to recover lost time with the aim of achieving completion of the Project within the stipulated contract Duration, plus authorized time extensions. In such case, special attention must be given to minimize delays as much as possible and must establish the nature of efforts; for instance, resources and equipment required, extended hours of work, weekend work, accelerated fabrication, required action(s) or effort(s) by the Contractor, its Subcontractors, consultants, clients, end users and/or other concerned parties to recover the schedule.
Revised and/or Updated Schedule	A Baseline Schedule, Progress Project Schedule, or Recovery Schedule for the Project that shows the actual Duration of all the completed Activities, including Duration of and the reasons for delays, if any has occurred, AND revisions to all remaining Activities of the Contractor and its Subcontractors, including changes, if any, to logical ties, interrelations and the sequence of each of the outlined Activities. Any such revisions should be shown on the row just below the approved schedule of the respective Activity so that revisions can be compared. The Revised and/or updated Schedule must be reviewed and approved by the City.
Start Date	The earliest estimated date an Activity is calculated to begin, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.
Time Impact Analysis	A forward looking (prospective) schedule analysis used to forecast the impact to the Critical Path and to Milestone Finish Dates caused by a single event or series of events. Time Impact Analysis is not a retrospective (forensic) schedule analysis or a what-if schedule analysis of a potential event.
Total Float	The amount of time the start or finish of an Activity can be delayed without affecting the Project completion date.
Work Breakdown Structure (WBS)	WBS is a deliverable-oriented decomposition of a Project into smaller components. A WBS provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control.
Work Days (WD)	Work Days are every consecutive day in the calendar, excluding weekends (Saturday and Sunday) and holidays.

1.5 PRELIMINARY, BASELINE, AND PROJECT SCHEDULE PREPARATION TIMELINE:

A. Upon receipt of the NTP, the Contractor must promptly prepare a preliminary Project Schedule and subsequently a Baseline Schedule and must submit for the City's acceptance as follows:

1. The preliminary Project Schedule must be submitted no later than fifteen (15) Days after NTP.
2. The initial submittal of the Baseline Schedule must be provided to the City for review no later than thirty (30) Days after NTP.

3. The Contractor must incorporate all corrections and revisions required by the City and provide an updated version of the Baseline Schedule for review and acceptance no later than sixty (60) Days after NTP to ensure that the Baseline Schedule is accepted. The sixty (60) Days must include fourteen (14) Days review times for each submittal of the Baseline Schedule.

4. Once accepted, the Baseline Schedule will be the basis of Project Schedule updates.

1.6 PRELIMINARY PROJECT SCHEDULE DEVELOPMENT:

A. The preliminary Project Schedule must be a detailed plan (division level per Construction Specifications Institute (CSI) MasterFormat) of all operations, including submittals, permitting, testing, and construction Activities, for either the first ninety (90) Days after NTP or to the point where the Contractor plans to mobilize on site (whichever is greater). This submittal will also depict a summary level (section level per CSI MasterFormat) schedule of the major Activities for the remainder of the Work.

1. All Activities for Contractor mobilization, procurement, and construction Activities within the first sixty (60) Days, including permits and submittals. All remaining work forecasted after the first sixty (60) Days must be summarized through the Contract's completion date.
2. All submittal and procurement Activities for long lead items.
3. The Project's Critical Path.
4. An electronic copy of the schedule in either MS Project (.MPP) or Primavera P6 Professional Format (.XER).

B. The preliminary Project Schedule will be reviewed by the City and returned with comments, as necessary, within fourteen (14) Days of submittal receipt. Information from the preliminary Project Schedule will be the general foundation for development of the Baseline Schedule.

1.7 PROJECT SCHEDULE:

A. The Baseline Schedule must show the sequence in which the Contractor proposes to perform the Work, and account for all major and intermediate Milestone Activities, phasing, restrictions of access, availability of work areas and the availability and use of labor, materials, and equipment.

B. After the Baseline Schedule is approved, the Project Schedule must be the Contractor's working schedule and must be used to plan, organize, execute, and track the Project. The Project Schedule is the primary vehicle used to report actual performance, progress, and convey the Contractor's execution plan to complete the Work.

C. The Project Schedule must show the sequence in which the Contractor proposes to perform the Work, and account for all major and intermediate Milestone Activities, phasing, restrictions of access, availability of work areas and the availability and use of labor, materials, and equipment.

D. The Project Schedule must be the Contractor's working schedule used to plan, organize, execute, and track the Project. The Project Schedule is the primary vehicle used to report actual performance, progress, and convey the Contractor's execution plan to complete all remaining Work.

E. All delay claims must be based on the current approved updates of the Project Schedule.

F. The Contractor must confirm in writing that all Subcontractors performing any portion of the Work are in agreement with the accepted Baseline Schedule and the monthly updates.

G. The amount of detail represented in the Baseline and Project Schedule and supporting documents submitted must, at a minimum, include the following items:

1. Contract Milestones must be identified and included in the Baseline and Project Schedule.
2. All submittal, owner review & approval, purchase, manufacture, and delivery Activities for all major materials and equipment.
3. Deliveries of owner-furnished equipment and/or materials.
4. Preparation, submittal, and approval of drawings, material samples, and safety plans.
5. Preparation, submittal, review, and approval of permits required by all regulatory agencies and other third parties.
6. Performance of tests, submission of test reports, and approval of test results.
7. Commissioning Activities for all commissioned systems and equipment is to be clearly delineated and scheduled such that they will be completed prior to Substantial Completion. Such Activities must include, at a minimum, Pre-Functional testing and check sheets; Testing, Adjusting, and Balancing (TAB) verification; Functional Testing, including testing of all controls; and Owner's demonstration and orientation.
8. Completion dates of all items required for phased completion (if applicable).
9. Completion dates of all items required for Substantial Completion.
10. Completion dates of all items required to obtain a Temporary Certificate of Occupancy (TCO) and Certificate of Occupancy (CO).
11. Completion dates for close-out of regulatory and punch list items prior to Final Acceptance and transfer of the Project.
12. Any additional detail requested by the Commissioner.

H. Activities identified in the Baseline and Project Schedule must have the Duration in units of whole Work Days. Construction Activity Durations must not exceed twenty (20) Work Days unless specifically approved by the City. This is to ensure that Activities are not generalized and that each Activity and sub-Activity are defined as narrowly as reasonable to facilitate schedule tracking. Durations for non-construction Activities such as procurement of materials, delivery of equipment, concrete curing, etc., may exceed twenty (20) Work Days without prior approval; however, these are still subject to review by the City. Durations must be based on the available resources required for performing each Activity and must be the result of definitive labor hours using established production rates, and with consideration of on-site working conditions. If requested by the City, the Contractor must justify the reasonableness of a planned Duration.

I. Activity descriptions must use plain language that clearly and uniquely defines each Activity. Each description must include a verb or work function (e.g. submit, form, pour, etc.), an object (e.g. slab, foundation, etc.) and, for any construction Activities, a specific location. The Work related to each Activity must be limited to one responsibility and one trade.

J. Activity relationships must be assigned to clearly establish predecessor and successor relationships to each Activity. Open-ended Activities are not permitted with the exception of the first and last Activity in the network, the first Activity being NTP and the last being Final Acceptance. The use of relationship lag times is discouraged and only permitted with prior approval by the City. The use of negative lag is never permitted.

K. Activity constraint dates are only to be used to reflect contractual constraints unless specifically authorized by the City.

L. Float or slack, in any schedule, must not be for the exclusive use or benefit of either the City or the Contractor, but must be available for use by both the City and the Contractor.

M. Each resubmittal after the Project Schedule is delivered for acceptance must comply with all requirements of this section. Review and response by the City will be given within fourteen (14) Days after resubmission. The Contractor's receipt of the comments within the time specified must not, in any way, affect the Contractor's responsibility to complete the Project within the time fixed in Schedule A.

N. Failure by the City to return comments or indicate acceptance status will in no way relieve the Contractor's obligation to submit monthly schedule updates.

O. At the request of the City, the Contractor must be required to make a presentation to explain or clarify the intended logical sequence of construction Activities depicted in the detailed Project Schedule. The Contractor and designated scheduler must discuss anticipated challenges and outline construction methodology and flow of work to show how and when major Milestones will be achieved. In addition, the Contractor may, at no cost to the City, be required to participate in additional Project meetings necessary to obtain acceptance of the above-noted submittals.

1.8 ACTIVITY AND CALENDAR CODING STRUCTURE:

A. The Baseline and Project Schedules must contain a sufficient number of Activities to represent adequate planning and execution of the Work so that it shows an accurate flow of work and demonstrates an understanding of the Project by the Contractor.

B. Activity ID and Calendar Coding

1. The Contractor's proposed Activity and calendar coding and must be submitted with the preliminary Project Schedule. A meeting may be requested by the City to discuss the scheme and other schedule information prior to the submittal of the Project Schedule. The accepted coding scheme and WBS Structure must be incorporated into the Project Schedule.

C. Activity ID Coding

1. All Activities/ Resources/ Calendars (Baseline and Project Schedules) must be coded inside the P6 Project Environment / Project Level (NOT the Global Environment/ Enterprise Level) to facilitate selection, sorting and preparation of reports.

2. Activity coding must consist of the Project ID followed by a dash, followed by Activity coding (PROJECT ID-ACTIVITY CODE). Activity codes must be created at the Project level and must utilize the coding scheme outlined in the table below:

Activity Code	Meaning
RESP	Responsibility: Identify the party (e.g. Contractor, Subcontractor, City, etc.) responsible for the Activity.
PHAS	Phase: Breakdown of Activities in Milestones, pre-construction, procurement, construction and close-out Activities.
LOCN	Location: Breakdown by floor or elevation.
AREA	Area: Breakdown by room, area, block or wing. May be used as a subdivision of PHAS to include Milestones, permits, Subcontractor approvals, submittals, fabrication and delivery, and subdivision of the Site and buildings into Logical modules, such as by blocks, wings, etc.
TRAD	Trade: Breakdown by CSI Code or section number in the Specifications.

a. Description of schedule Activities must include terminology that represents the scope of work associated with that particular Activity. Terminology used to describe similar actions must be consistent across all segments of work.

b. Naming convention for schedule Activities must be descriptive and indicate the associated work covered by the Activity. Activities must use a verb, noun, and location of the work in the Activity name.

3. Project Calendar Coding

a. All calendars created and assigned to Activities must be Project-level calendars. The Calendar Name must consist of the Project ID number followed by a dash, followed by a descriptive Calendar Name (PROJECT ID-CALENDAR NAME).

1.9 WORK BREAKDOWN STRUCTURE:

A. Structure must be submitted with the preliminary Project Schedule. The levels (nodes) must include, but not be limited to:

1. LEVEL 01 – The Project Level.
2. LEVEL 02 – Contains a minimum of four (4) nodes: Pre-Construction, Procurement, Construction or Phase of Construction, and Closeout.
3. LEVEL 03 – Decomposition of each of the four (4) nodes in Level 02 into its constituent parts. This level must target specific, tangible, deliverable scopes of Project Work.

B. The Contractor's proposed WBS must be submitted with the preliminary Project Schedule. The accepted WBS Structure must be incorporated into the Baseline and Project Schedule.

1.10 MAJOR MILESTONES:

A. The schedule must include both contractual and non-contractual Milestones that are provided by the City. These Milestones must be properly associated with the related Work and maintained to represent the progress of the Project and account for all required inspections and approvals to achieve project completion.

1.11 SHORT (THREE-WEEK) INTERVAL / TWO-WEEK LOOK-AHEAD:

A. On a bi-weekly basis, the Contractor must provide a three (3) week short interval schedule in a format satisfactory to the City. The purpose of this schedule is to report the actual progress of the past week against the previous short interval look-ahead Activities and add any additional Activities planned for the next two (2) weeks. Electronic files and hard copies must be provided to the City on the first day of each work week with the prior week's actual progress included.

B. Each task listed on the short interval schedule must be representative of the most current Project Schedule Update and include a reference to an Activity shown on the current update.

C. The short interval schedule must list all required DDC coordinated activities, including special inspections.

1.12 SUBMITTALS:

A. General

1. Development of the Baseline Schedule and updating of the Project Schedule must follow the DCMA and AACE International guidelines.
2. Each electronic submission of the Project Schedule must be assigned a unique file name consisting of the Project ID (as noted on the NTP followed by a dash followed by a unique file name clearly marked (i.e. ProjID- B000 = B/L rev0, ProjID-B001 = B/L rev01 etc.) to indicate

the specific submission. Similarly, update submittals must be named ProjID-Uxxx where xxx is a sequential number, starting with 001, indicating the revision or issue number.

3. The Contractor must provide all submittals in electronic format and two hard copies.

B. Preliminary Project Schedule

1. For acceptance of the preliminary Project Schedule, the Contractor must submit the following:

a. Two (2) 11” x 17” hard copies of the proposed preliminary Project Schedule, as well as the native electronic schedule data file, in .XER file format, per the direction of the City.

b. A Schedule Narrative Report detailing the Contractor’s initial plan for executing the Contract work within the allotted Contract Duration, and include the following explanation of their provided preliminary schedule:

i. The proposed WBS;
ii. All proposed Project Calendars;
iii. All proposed Activity Codes, clearly defined;
iv. The proposed Activity ID format; and
v. Schedule basis narrative, which must memorialize assumptions made in the development of the schedule.

C. Baseline Schedule

1. The City will normally return comments within ten (10) Work Days after receipt of the initial Project Schedule Submission. If any of the required submissions are returned to the Contractor for corrections or revisions, they must be resubmitted within five (5) Work Days from receipt of comments. Each resubmittal must comply with the requirements enumerated above. Review and response by the City will be given within ten (10) Work Days after resubmission.

2. At the request of the City, the Contractor will be required to participate in Project meetings necessary to obtain an acceptance of the above noted submittals.

3. Baseline schedule must include the actual schedule for the initiation, procurement, submittal, permit, construction activity, inspection, substantial and final completion, and closeout phases. Schedule performance during construction and closeout is measured against this baseline.

4. The project may be re-baselined only if the project experiences significant change in the scope, cost and / or schedule due to extenuating circumstances and reasons beyond the control of DDC. Commissioner approval is required to re-baseline a project.

5. Baseline Schedule submittal must contain a Narrative Report. It must include the following, or as directed by the City:

a. A description of the Project scope and how the Work is represented in the schedule Activities;

b. A description of the overall sequence of major components of Work;

c. Planned work week for each definable feature of work;

d. Description of the Critical Path and near Critical Paths;

e. How weather will be accommodated in the schedule, including a description of the weather calendar and the Activities it is applied to, and the NOAA Inclement Weather data that defined the number of non-work days;

f. How regulatory, operational or third-party constraints are accommodated in the schedule;

g. Description of key Project coordination points or events;

h. Discussion of long lead items and basis of time frames for submittals; and

i. Potential opportunities and risks, including quantification of the schedule reduction or expansion.

D. Project Schedule Updates

1. Every schedule submittal must be provided with a corresponding narrative. These schedule submittals and narratives are to be submitted in hard copy, as well as in the native electronic format, as attachments to emails or other media accepted by the City. When opened, the electronic format must provide flawless restoration of the native files (P6 (.XER) for Primavera and MS Word and/or Adobe Acrobat for Narrative and supporting document submittals).

2. For each submittal of the updated Project Schedule, the following layouts, reports, and graphics are required in the specified formats, unless otherwise directed by the City:

a. The Contractor must furnish two (2) 11” x 17” color hard copies of the complete progress schedule with each initial schedule update and final update incorporating comments furnished by the City. Additionally, the Contractor must provide the native electronic schedule data file, in .XER file format with the initial and final schedule update submission.

b. An Activity bar chart Layout grouped by Activity Code and then sorted by Start Date, Finish Date, and then Total Float.

c. Each Activity line must display the Activity ID (Act ID), Description (Name), Original Duration (OD), Remaining Duration (RD), Start Date (ES), Finish Date (EF), and Total Float (TF), Baseline Original Duration (BL OD) Baseline Start (BL Start), Baseline Finish (BL Fin), Baseline Total Float (BL TF).

d. An Activities progress bar must show both current progress update ES and EF, and baseline ES and EF. The top line of the bar chart area must contain the updated ES and EF; the second line below must depict the accepted baseline ES and EF dates.

3. The City may request additional standard P6 reports from time to time at no additional cost.

4. The Monthly Update submittal must contain a Narrative Report. It must include the following, or as directed by the City:

a. Any changes to the schedule basis narrative;

b. Overall health of the Project;

c. Actual Activity Start Dates;

d. Actual Activity Finish Dates;

e. The physical conditions that were used to update Activities percent complete;

f. Percent of Work reported in place;

g. A description of the overall sequence of major components of Work;

h. Description of the Critical Path and near Critical Paths;

i. Description of key Project coordination points or events;

j. Discussion of long lead items and basis of time frames for submittals;

k. Potential opportunities and risks, including quantification of the schedule reduction or expansion;

l. Assumptions/exclusions made in the schedule;

m. Contract and Milestone completion date status:

i. Number of Days ahead or behind schedule and; and

ii. Days lost/gained compared with the previous update.

n. Lookahead report listing each Activity in the CPM schedule that is scheduled to be performed during the next reporting period;

o. Changes in Activity description, Logic, or Duration must be submitted as a separate Proposed Schedule and approved by the City prior to being submitted as an official update. Once allowed, said changes must be grouped and organized in the report in a manner that communicates in detail the rationale associated with each change and the impact upon construction sequence, relationships and the Critical Path. A standard Digger Report is not sufficient to meet this requirement;

p. Added/deleted Activities and the rationale associated with each action;

q. Pending issues and status of other items;

r. Permits, FDNY sign-off, TCO and CO approval to ensure regulatory acceptance and conditions for occupancy, in a tabular format, showing the status and change in status of all permits;

s. Contract modifications; and

t. Extra Work, including change orders.

1.13 PROJECT SCHEDULE UPDATING:

A. The initial updating must take place immediately after the City accepts the Contractor's Baseline Schedule. The Data Date for the first update must not exceed seven (7) Days from the date of receipt of the accepted Baseline Schedule, or as directed by the City.

B. Subsequent updates of the Project Schedule must be submitted monthly until Substantial Completion. The schedule Data Date must be the last Work Day of the period unless otherwise directed by the City. Updates must be provided to the City no later than seven (7) Days after the ‘schedule Data Date’.

C. Updates must reflect actual or reasonably anticipated progress as of the last Work Day of the period.

D. The City may request meetings with the Contractor to review the Project Schedule and narrative and jointly verify Project health and information.

E. In addition, the City may request meetings with the Contractor’s scheduling representative to:

1. Resolve out-of-sequence Logic.

2. Should out-of-sequence progress occur where Activities have reported progress without predecessor Activities being completed, the Contractor must obtain the City’s approval in a Proposed Schedule before revising the Logic ties to reflect the way the Work is actually being performed. Use of progress override by default mechanisms that may be included in CPM scheduling software systems will not be allowed except on a case-by-case basis with the approval of the City. A written explanation for each instance must be included in the monthly submittal narrative.

3. Assess the impact, if any, of any pending change orders.
4. Incorporate accepted time extensions.
5. Review revised Logic (as-built and projected) and changes in Activity Duration, cost, and labor hours assigned.

F. Contractor's failure to provide required scheduling information within the required timeframe or to adhere to the currently accepted schedule may result in rejection of all or a portion of the progress payment until such time as the required schedule information is submitted and accepted by the City.

G. Delays to the Critical Path – Whenever it becomes apparent from the monthly CPM schedule update that delays to the Critical Path have occurred due to action or inaction of the Contractor, and as a result the date for Substantial Completion will not be met, the Contractor must promptly take some or all of the following actions at no additional cost to the City, unless otherwise directed by the City:

1. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of Work.
2. Increase the number of working hours per shift, shifts per day, or Work Days per week; the amount of construction equipment; the forms for concrete work; etc., or any combination of the foregoing to substantially eliminate the backlog of Work.
3. Reschedule Activities to achieve maximum practical concurrence of accomplishment of Activities and comply with the revised schedule.
4. Submit to the City for review a written statement of the steps the Contractor intends to take to remove or arrest the delay to the schedule.
5. Add to its equipment and materials or construction forces, as well as increase the working hours, if operations for critical, less critical or non-critical Activities fall behind the Contractor's Baseline Schedule at any time during the construction period.

H. The City may, at any time during the Project and at no additional cost to the City, require the Contractor to develop a more detailed schedule/ Fragnet than depicted in the Baseline Schedule to provide a clearer understanding of the effort needed to complete an Activity or group of Activities.

I. If the City determines that either the Critical Path is in the negative by four (4) weeks, or that the Project's date for completion may be affected, the Contractor may be required, at no additional cost to the City, to prepare a Recovery Schedule. Such Recovery Schedule is subject to review and acceptance by the City. The Recovery Schedule must propose alternative methods, overtime, and other means available to the Contractor to recover the delays incurred to date.

J. The Contractor must submit an "As-Built Schedule", as the last schedule update showing all Activities, with the exception of punch list and closeout tasks, at Substantial Completion. This schedule must reflect the exact manner in which the Project was actually constructed.

1.14 TIME IMPACT ANALYSIS:

A. In addition to the requirements of the Standard Construction Contract Article 11, the Contractor must submit a Time Impact Analysis to the Commissioner with all requests for time extension.

B. The Time Impact Analysis must include a written narrative and supporting impact schedule Fragnet detailing the Project delays resulting from the alleged delay. The impact schedule Fragnet, separate and distinct from the Progress Schedule update, must demonstrate that the changes or anticipated delays affect Activities of the current accepted Progress Schedule. The impact schedule will be incorporated into the Progress Schedule only after it is accepted by the Commissioner and a time extension is approved. The Fragnet submitted as part of the Time Impact Analysis must illustrate the impact of these changes or delays on the date for Substantial Completion.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 32 16.10

SECTION 01 32 16.20
PROJECT SCHEDULES (METHOD B)

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 32 16.20

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes the following:
1. Methods
2. Definitions
3. Preliminary, Baseline, and Project Schedule Preparation Timeline
4. Preliminary Project Schedule Development
5. Project Schedule
6. Activity and Calendar Coding Structure
7. Work Breakdown Structure (WBS)
8. Major Milestones
9. Short (Three-Week) Interval/Two-Week Look-Ahead
10. Submittals
11. Project Schedule Updating
12. Time Impact Analysis

1.3 METHODS:

A. The Contractor must comply with Project schedule development and updating requirements as specified herein.

1. The Contractor must employ or retain the services of a Construction Scheduler with verifiable construction scheduling experience, subject to review and acceptance by the City. Upon request, the Contractor must provide the City with qualifications and experience of the proposed scheduling staff member(s).

2. The Contractor must prepare, update, and maintain a detailed Project Schedule using a version of scheduling software that is compatible with the City's Oracle Primavera P6 Enterprise Project Portfolio Management (EPPM). All schedule submittals must be developed using Oracle's Primavera P6 EPPM software. Schedules must be developed using accepted CPM techniques using the Precedence Diagramming Method (PDM). The Project Schedule must be developed following Defense Contract Management Agency (DCMA) and American Association of Cost Engineering International (AACE International) guidance. The Contractor will be required to use

the Contractor's own P6 license (whether single-user or Enterprise license), unless otherwise directed by the Commissioner. If directed by the Commissioner prior to the Notice to Proceed (NTP), the Contractor must use the Department's P6 Enterprise license and develop the Progress Schedule within the Department's Enterprise environment.

3. Once the Baseline Schedule is accepted by the City, progress updates to the Project Schedule must be submitted monthly, unless otherwise directed by the City, until Substantial Completion. The Data Date for the schedule updates must use the last Friday of the month, or as directed by the City.

4. The Contractor will be responsible for providing the monthly schedule updates once the Baseline Schedule is approved. Each monthly schedule update must be accompanied with a schedule narrative that explains the following:

   a) The progress of work during that particular period of performance;
   b) Any changes in schedule Logic;
   c) The physical conditions that were used to update every Activities Percent Complete;
   d) Any change in actual Start and Finish Dates;
   e) Any Duration changes;
   f) Any added and deleted Activities; and,
   g) Any added Extra Work (e.g., change orders).

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	**Definition**
Activity	A representation of a discrete portion of the overall scope of Work or an event through Duration and description in a CPM schedule.
Baseline Schedule	The planned and detailed CPM schedule of Activities, including all Logic, Durations, Resource and Cost Loading, and showing the entire scope of Work. The Baseline Schedule must be accepted by the City.
Critical Path	The longest sequence of Activities in a network which establishes the minimum length of time for accomplishment of the end event of the Project.
Critical Path Method (CPM)	A management technique used to plan and control a Project which combines all relevant information into a single plan defining the sequence and Duration of operations and depicting the interrelationship of the Work elements required to complete the Project.
Current Schedule	The most recently updated schedule that captures progress to date and forecasts the dates for each Activity.
Data Date	The date used as a starting point for scheduling calculations. The Data Date is changed to the current end of period date when a schedule is updated for progress.
Duration	The amount of time, in workdays, an Activity will take to perform.

Term	Definition
Finish Date	The earliest estimated date an Activity is calculated to be complete, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.
Free Float	The calculated amount of time that the estimated start or finish of an Activity can be delayed without impacting the start or finish of other downstream Activities logically connected in a progressive relationship. (See Finish Date and Late Finish).
Fragnet	Fragmentary network: a portion of a schedule detailing impacts of an event on specific Activities in the broader schedule.
Inclement Weather	Any weather condition, the duration of which varies in excess of the 3-year average published by the National Oceanic and Atmospheric Administration (NOAA) information for the local area.
Integrated Project Schedule	The Commissioner's overall schedule covering design, procurement, and construction. The Commissioner will use the Contractor's Project Schedule to update the Integrated Project Schedule.
Late Finish	An estimate of the latest plausible date an Activity's completion can be postponed without rendering as unachievable the required completion of any downstream Milestones to which the Activity is Logically connected to in a progressive relationship.
Late Start	An estimate of the latest plausible date an Activity's start can be postponed without rendering as unachievable the required completion of any downstream Milestones to which the Activity is Logically connected to in a progressive relationship.
Logic	A direct progressive relationship between Activities where one Activity's performance restricts the performance of another Activity.
Milestone	A key or critical point in time for reference or measurement.
Network Diagram	A graphic diagram of a network schedule, showing Activities and Activity relationships.
Original Duration	The estimated amount of time, in Work Days, an Activity is expected to take to complete at the beginning of a Project as anticipated by the Contractor based on its planned means and methods at time of bid and documented in the Baseline Schedule.
Percent Complete	The percentage of the scope of Work represented by an Activity completed as of the Data Date calculated as physical percent complete for payment purposes.
Project Schedule	The Contractor's schedule used to manage the orderly and expeditious completion of the Work. The Project Schedule is initially the accepted Baseline Schedule, and is updated throughout the Project.

Term	Definition
Remaining Duration	The amount of time, in Work Days, the remaining scope of Work represented by an Activity is expected to take to complete, measured from the current Data Date.
Resource and Cost Loading	Values assigned for estimated dollars, manpower, equipment and/or materials necessary to complete the scope of Work represented by a specific Activity.
Recovery Schedule	A Recovery Schedule outlining and incorporating extraordinary efforts required to recover lost time with the aim of achieving completion of the Project within the stipulated contract Duration, plus authorized time extensions. In such case, special attention must be given to minimize delays as much as possible and must establish the nature of efforts; for instance, resources and equipment required, extended hours of work, weekend work, accelerated fabrication, required action(s) or effort(s) by the Contractor, its subcontractors, consultants, clients, end users and/or other concerned parties to recover the schedule.
Revised and/or Updated Schedule	A Baseline Schedule, Project Schedule, or Recovery Schedule for the Project that shows the actual Duration of all the completed Activities, including Duration of and the reasons for delays, if any have occurred, AND revisions to all remaining Activities of the Contractor and its subcontractors, including changes, if any, to logical ties, interrelations and the sequence of each of the outlined Activities. Any such revisions should be shown on the row just below the approved schedule of the respective Activity so that revisions can be compared. The Revised and/or updated Schedule must be reviewed and approved by the City.
Start Date	The earliest estimated date an Activity is calculated to begin, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.
Time Impact Analysis	A forward looking (prospective) schedule analysis used to forecast the impact to the Critical Path and to Milestone Finish Dates caused by a single event or series of events. Time Impact Analysis is not a retrospective (forensic) schedule analysis or a what-if schedule analysis of a potential event.
Total Float	The amount of time the start or finish of an Activity can be delayed without affecting the Project completion date.
Work Breakdown Structure (WBS)	WBS is a deliverable-oriented decomposition of a Project into smaller components. A WBS provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control.
Work Days (WD)	Work Days are every consecutive day on the calendar, excluding weekends (Saturday and Sunday) and holidays.

1.5 PRELIMINARY, BASELINE, AND PROJECT SCHEDULE PREPARATION TIMELINE:

A. Upon receipt of the NTP, the Contractor must promptly prepare a preliminary Project Schedule and subsequently a Baseline Schedule and must submit for the City's acceptance as follows:

1. Submit the Contractor's CPM Scheduler's qualifications to the City for approval within seven (7) Days after NTP. The City will respond to the submittal within seven (7) Days of the submittal receipt.
2. The preliminary Project Schedule must be submitted no later than twenty-one (21) Days after NTP.
3. The initial submittal of the Baseline Schedule must be provided to the City for review no later than forty-five (45) Days after NTP.
4. The Contractor must incorporate all corrections and revisions required by the City and provide an updated version of the Baseline Schedule for review and acceptance no later than seventy-five (75) Days after NTP to ensure that the Baseline Schedule is accepted no later than ninety (90) Days after the NTP. The ninety (90) Days must include fourteen (14) Days review time by the City for each submittal of the Baseline Schedule.
5. Once accepted, the Baseline Schedule will be the basis of Project Schedule updates.

B. Remedies

1. Preliminary Project Schedule: The City will take a credit of three thousand dollars ($3,000) if the preliminary Project Schedule is not submitted within twenty-one (21) Days of the NTP.
2. Acceptable Baseline Schedule: The City will take a credit of five thousand dollars ($5,000) if an acceptable Baseline Schedule is not submitted within ninety (90) Days of the NTP.
3. Monthly Progress Schedule updates: The City will take a credit of two thousand dollars ($2,000) for each schedule update not submitted within the period it was due.
4. Scheduling Firm Services: If an acceptable Baseline Schedule is not provided by the Contractor within ninety (90) Days of the NTP or three (3) updates are not provided by the Contractor during the period they are due, the City may engage the services of a scheduling firm to develop a Project schedule or update an existing schedule. The total cost of such services will be deducted from the monies due to the Contractor.
   a. Any schedules and updates developed by such scheduling firm are for the City's sole use and do not, in any way, represent an acceptance of responsibility by the City to schedule the Work or relieve the Contractor of the obligation to complete the Work within the Durations specified by the Contract.
5. The City will only accept the submitted information after all corrections have been made and all issues have been resolved. The City may find the Contractor in default if items required by this Section are incomplete.

1.6 PRELIMINARY PROJECT SCHEDULE DEVELOPMENT:

A. The preliminary Project Schedule must be a detailed plan (division level per Construction Specifications Institute (CSI) MasterFormat) of all operations, including submittals, permitting, testing, and construction Activities, for either the first ninety (90) Days after NTP or to the point where the Contractor plans to mobilize on site (whichever is greater). This submittal will also depict a summary level (section level per CSI MasterFormat) schedule of the major Activities for the remainder of the Work.

B. The preliminary Project Schedule will be reviewed by the City and returned with comments, as necessary, within fourteen (14) Days of submittal receipt. Information from the preliminary Project Schedule will be the general foundation for development of the Baseline Schedule.

1.7 PROJECT SCHEDULE:

A. The Baseline Schedule must show the sequence in which the Contractor proposes to perform the Work, and account for all major and intermediate Milestone Activities, phasing, restrictions of access, availability of work areas and the availability and use of labor, materials, and equipment.

B. After the Baseline Schedule is approved, the Project Schedule must be the Contractor's working schedule and must be used to plan, organize, execute, and track the Project. The Project Schedule is the primary vehicle used to report actual performance, progress, and convey the Contractor's execution plan to complete all of the Work.

C. The Project Schedule must show the sequence in which the Contractor proposes to perform the Work, and account for all major and intermediate Milestone Activities, phasing, restrictions of access, availability of work areas and the availability and use of labor, materials, and equipment.

D. The Project Schedule must be the Contractor's working schedule used to plan, organize, execute, and track the Project. The Project Schedule is the primary vehicle used to report actual performance, progress, and convey the Contractor's execution plan to complete all remaining Work.

E. All delay claims must be based on the current approved updates of the Project Schedule.

F. The Contractor must confirm in writing that all subcontractors performing any portion of the Work are in agreement with the accepted Baseline Schedule and the monthly updates.

G. The amount of detail represented in the Baseline and Project Schedule and supporting documents submitted must, at a minimum, include the following items :

1. Contract Milestones must be identified and included in the Baseline and Project Schedule.
2. All submittal, owner review & approval, purchase, manufacture, and delivery Activities for all major materials and equipment.
3. Deliveries of owner-furnished equipment and/or materials.
4. Preparation, submittal, and approval of drawings, material samples, and safety plans.
5. Preparation, submittal, review, and approval of permits required by all regulatory agencies and other third parties.
6. Performance of tests, submission of test reports, and approval of test results.
7. Commissioning Activities for all commissioned systems and equipment is to be clearly delineated and scheduled such that they will be completed prior to Substantial Completion. Such Activities must include, at a minimum, Pre-Functional testing and check sheets; Testing, Adjusting, and Balancing (TAB) verification; Functional Testing, including testing of all controls; and Owner's demonstration and orientation.
8. Completion dates of all items required for phased completion (if applicable).
9. Completion dates of all items required for Substantial Completion.
10. Completion dates of all items required to obtain a Temporary Certificate of Occupancy (TCO) and Certificate of Occupancy (CO).
11. Completion dates for close-out of regulatory and punch list items prior to Final Acceptance and transfer of the Project.
12. Any additional detail requested by the Commissioner.

H. Activities identified in the Baseline and Project Schedule must have the Duration in units of whole Work Days. Construction Activity Durations must not exceed twenty (20) work days unless specifically approved by the City. This is to ensure that Activities are not generalized and that each Activity and sub-Activity are defined as narrowly as reasonable to facilitate schedule tracking. Durations for non-construction Activities such as procurement of materials, delivery of equipment, concrete curing, etc., may exceed twenty (20) work days without prior approval; however, these are still subject to review by the City. Durations must be based on the available resources required for performing each Activity and must be the result of definitive labor hours using established production rates, and with consideration of on-site working conditions. If requested by the City, the Contractor must justify the reasonableness of a planned Duration.

I. Activity descriptions must use plain language that clearly and uniquely define each Activity. Each description must include a verb or work function (e.g. submit, form, pour etc.) an object (e.g. slab, foundation, etc.) and, for any construction Activities, a specific location. The Work related to each Activity must be limited to one responsibility and one trade.

J. Activity relationships must be assigned to clearly establish predecessor and successor relationships to each Activity. Open-ended Activities are not permitted with the exception of the first and last Activities in the network, the first Activity being NTP and the last being Final Acceptance. The use of relationship lag times is discouraged and only permitted with prior approval by the City. The use of negative lag is never permitted.

K. Activity constraint dates are only to be used to reflect contractual constraints unless specifically authorized by the City.

L. Float or slack in any schedule must not be for the exclusive use or benefit of either the City or the Contractor, but must be available for use by both the City and the Contractor.

M. Each resubmittal after the Project Schedule is delivered for acceptance must comply with all requirements of this section. Review and response by the City will be given within fourteen (14) Days after resubmission. The Contractor's receipt of the comments within the time specified must not in any way affect the Contractor's responsibility to complete the Project within the time fixed in Schedule A.

N. Failure by the City to return comments or indicate acceptance status will in no way relieve the Contractor's obligation to submit monthly schedule updates.

O. At the request of the City, the Contractor must be required to make a presentation to explain or clarify the intended logical sequence of construction Activities depicted in the detailed Project Schedule. The Contractor and designated scheduler must discuss anticipated challenges and outline construction methodology and flow of work to show how and when major Milestones will be achieved. In addition, the Contractor may, at no cost to the City, be required to participate in additional Project meetings necessary to obtain acceptance of the above noted submittals.

1.8 ACTIVITY AND CALENDAR CODING STRUCTURE:

A. The Baseline and Project Schedules must contain a sufficient number of Activities to represent adequate planning and execution of the Work so that it shows an accurate flow of work and demonstrates an understanding of the Project by the Contractor.

B. Activity ID and Calendar Coding

1. The Contractor's proposed Activity and calendar coding and must be submitted with the preliminary Project Schedule. A meeting may be requested by the City to discuss the scheme and other schedule information prior to the submittal of the Project Schedule. The accepted coding scheme and WBS Structure must be incorporated into the Project Schedule.

C. Activity ID Coding

1. All Activities/Resources/Calendars (Baseline and Project Schedules) must be coded inside the P6 Project Environment / Project Level (NOT the Global Environment/Enterprise Level) to facilitate selection, sorting and preparation of reports.

2. Activity coding must consist of the Project ID followed by a dash, followed by Activity coding (PROJECT ID-ACTIVITY CODE). Activity codes must be created at the Project level and must utilize the coding scheme outlined in the table below:

Activity Code	Meaning
RESP	Responsibility: Identify the party (e.g. Contractor, subcontractor, City, etc.) responsible for the Activity.
PHAS	Phase: Breakdown of Activities in Milestones, pre-construction, procurement, construction and close-out Activities.
LOCN	Location: Breakdown by floor or elevation.
AREA	Area: Breakdown by room, area, block or wing. May be used as a subdivision of PHAS to include Milestones, permits, subcontractor approvals, submittals, fabrication and delivery, and subdivision of the Site and buildings into Logical modules, such as by blocks, wings, etc.
TRAD	Trade: Breakdown by CSI Code or section number in the Specifications.

a. Description of schedule Activities must include terminology that represents the scope of work associated with that particular Activity. Terminology used to describe similar actions must be consistent across all segments of work.

b. Naming convention for schedule Activities must be descriptive and indicate the associated work covered by the Activity. Activities must use a verb, noun, and location of the work in the Activity name.

3. Project Calendar Coding

a. All calendars created and assigned to Activities must be Project-level calendars. The Calendar Name must consist of the Project ID number followed by a dash, followed by a descriptive Calendar Name (PROJECT ID-CALENDAR NAME).

1.9 WORK BREAKDOWN STRUCTURE:

A. A multi-level hierarchal WBS must be incorporated in all P6 schedules. An initial, proposed WBS must be submitted with the preliminary Project Schedule. The levels (nodes) must include, but not be limited to:

1. LEVEL 01 – The Project Level.
2. LEVEL 02 – Contains a minimum of four (4) nodes; Pre-Construction, Procurement, Construction or Phase of Construction, and Closeout.
3. LEVEL 03 – Decomposition of each of the four (4) nodes in Level 02 into its constituent parts. This level must target specific, tangible, deliverable scopes of the Project Work.

B. The Contractor's proposed WBS must be submitted with the preliminary Project Schedule. The accepted WBS must be incorporated into the Baseline and Project Schedule.

1.10 MAJOR MILESTONES:

A. The schedule must include both contractual and non-contractual Milestones that are provided by the City. These Milestones must be properly associated with the related Work packages and maintained to represent the progress of the Project and account for all required inspections and approvals to achieve project completion.

1.11 SHORT (THREE-WEEK) INTERVAL / TWO-WEEK LOOK-AHEAD:

A. On a bi-weekly basis, the Contractor must provide a three (3) week short interval schedule in a format satisfactory to the City. The purpose of this schedule is to report the actual progress of the past week against the previous short interval look-ahead Activities and add any additional Activities planned for the next two (2) weeks. Electronic files and hard copies must be provided to the City on the first day of each work week with the prior week's actual progress included.

B. Each Task listed on the short interval schedule must be representative of the most current Project Schedule Update and include a reference to an Activity shown on the current update.

C. The short interval schedule must list all required DDC coordinated activities, including special inspections.

1.12 SUBMITTALS:

A. General

1. Development of the Baseline Schedule and updating of the Project Schedule must follow the DCMA and AACE International guidelines.

2. Each electronic submission of the Project Schedule must be assigned a unique file name consisting of the Project ID (as noted on the NTP followed by a dash followed by a unique file name clearly marked (i.e. ProjID- B000 = B/L rev0, ProjID-B001 = B/L rev01 etc.) to indicate the specific submission. Similarly, update submittals must be named ProjID-Uxxx where xxx is a sequential number, starting with 001, indicating the revision or issue number.

3. The Contractor must provide all submittals in electronic format and two hard copies.

B. Preliminary Project Schedule

1. For acceptance of the preliminary Project Schedule the Contractor must submit the following:

a. Two (2) 11" x 17" hard copies of the proposed preliminary Project schedule, as well as the native electronic schedule data file, in .XER file format, per the direction of the City.

b. A Schedule Narrative Report detailing the Contractor's initial plan for executing the Contract work within the allotted Contract Duration, and include the following explanation of their provided preliminary schedule:

i. The proposed WBS;
ii. All proposed Project Calendars;
iii. All proposed Activity Codes, clearly defined;
iv. The proposed Activity ID format; and
v. Schedule basis narrative, which must memorialize assumptions made in the development of the schedule.

C. Baseline Schedule

1. The City will return comments within ten (10) Work Days after receipt of the initial Project Schedule Submission. If any of the required submissions are returned to the Contractor for corrections or revisions, they must be resubmitted within five (5) Work Days from receipt of comments. Each resubmittal must comply with the requirements enumerated above. Review and response by the City will be given within ten (10) Work Days after resubmission.

2. At the request of the City, the Contractor will be required to participate in Project meetings necessary to obtain an acceptance of the above noted submittals.

3. Baseline schedule must include the actual schedule for the initiation, procurement, submittal, permit, construction activity, inspection, substantial and final completion, and closeout phases. Schedule performance during construction and closeout is measured against this baseline.

4. The project may be re-baselined only if the project experiences significant change in the scope, cost and / or schedule due to extenuating circumstances and reasons beyond the control of DDC. Commissioner approval is required to re-baseline a project.

5. Baseline Schedule submittal must contain a Narrative Report. It must include the following, or as directed by the City:

   a. A description of the Project scope and how the Work is represented in the schedule Activities;

   b. A description of the overall sequence of major components of Work;

   c. Planned work week for each definable feature of work;

   d. Description of the Critical Path and near Critical Paths;

   e. Basis of Durations, described in terms of quantity and production rate;

   f. How weather will be accommodated in the schedule, including a description of the weather calendar and the Activities it is applied to, and the NOAA Inclement Weather data that defined the number of non-Work Days;

   g. How regulatory, operational or third-party constraints are accommodated in the schedule;

   h. Description of key Project coordination points or events;

   i. Discussion of long lead items and basis of time frames for submittals;

   j. Description of anticipated means and methods for large quantity production Activities; and,

   k. Potential opportunities and risks, including quantification of the schedule reduction or expansion.

   l. Description of required permits, FDNY Sign-off, TCO & CO approval to ensure regulatory acceptance and conditions for occupancy.

D. Project Schedule Updates

1. Every schedule submittal must be provided with a corresponding narrative. These schedule submittals and narratives are to be submitted in hard copy, as well as in the native electronic format, as attachments to emails or other media accepted by the City. When opened, the electronic format must provide flawless restoration of the native files (P6 (.XER) for Primavera schedule files and MS Word and/or Adobe Acrobat for Narrative and supporting document submittals).

2. For each submittal of the updated Project Schedule, the following layouts, reports, and graphics are required in the specified formats, unless otherwise directed by the City:

   a. The Contractor must furnish two (2) 11” x 17” hard copies of the complete progress schedule with each initial schedule update and final update incorporating comments furnished by the City. Additionally, the Contractor must provide the native electronic schedule data file, in .XER file format, with the initial and final schedule update submission.

   b. An Activity bar chart layout grouped by Activity Code and then sorted by Start Date, Finish Date, and then Total Float.

   c. Each Activity line must display the Activity ID (Act ID), Description (Name), Original Duration (OD), Remaining Duration (RD), Start Date (ES), Finish Date (EF), and Total Float (TF), Baseline Original Duration (BL OD) Baseline Start (BL Start), Baseline Finish (BL Fin), Baseline Total Float (BL TF).

   d. An Activities progress bar must show both current progress update ES and EF, and baseline ES and EF. The top line of the bar chart area must contain the updated ES and EF; the second line below must depict the accepted baseline ES and EF dates.

3. The City may request additional standard P6 reports from time to time at no additional cost.

4. The Monthly Update submittal must contain a Narrative Report. It must include the following, or as directed by the City:

   a. Any changes to the schedule basis narrative
   b. A discussion of progress through the update period and status of the Project with respect to completion of the schedule. The progress reporting must detail work Activities that relate to the Project’s Critical Path and if these Activities are progressing as planned.
   c. A discussion of changes, delays or other circumstances affecting Progress including identified risks and opportunities and the Contractor’s strategy.
   d. A listing and brief explanation of modifications to the previously submitted network including Logic changes and Activity additions, deletions or modifications.
   e. An update on the status of long lead items and whether the item is on the Critical Path.
   f. The Contractor must report on all out of sequence Activities, the cause of this deviation to plan, and the proposed resolution of this issue.
   g. The Contractor must include an explanation of assumptions and exclusions made in developing the schedule update and narrative.
   h. A table of permits, showing status and any changes in status.

5. The Contractor must provide a copy of the computer file(s) in electronic format or other media accepted by the City. When opened, the electronic format must provide flawless restoration of the native files and an electronic copy of the Narrative Report.

1.13 PROJECT SCHEDULE UPDATING:

A. The initial updating must take place immediately after the City accepts the Contractor's Baseline Schedule. The Data Date for the first update must not exceed seven (7) Days from the date of receipt of the accepted Baseline Schedule, or as directed by the City.

B. Subsequent updates of the Project Schedule must be submitted monthly until Substantial Completion. The schedule data date must be the last Work Day of the period unless otherwise directed by the City. Updates must be provided to the City no later than seven (7) Days after the ‘schedule Data Date’.

C. Updates must reflect actual or reasonably anticipated progress as of the last Work Day of the period.

D. The City may request meetings with the Contractor to review the Project Schedule and Narrative and jointly verify Project health and information.

E. In addition, the City may request meetings with the Contractor's scheduling representative to:

1. Resolve out-of-sequence Logic;

2. Should out-of-sequence progress occur where Activities have reported progress without predecessor Activities being completed, the Contractor must obtain the City's approval in a Proposed Schedule before revising the Logic ties to reflect the way the Work is actually being performed. Use of progress override by default mechanisms that may be included in CPM scheduling software systems will not be allowed except on a case-by-case basis with the approval of the City. A written explanation for each instance must be included in the monthly submittal narrative.

3. Assess the impact, if any, of any pending change orders.

4. Incorporate accepted time extensions.

5. Review revised Logic (as-built and projected) and changes in Activity Duration, cost, and labor hours assigned.

F. Contractor's failure to provide required scheduling information within the required timeframe or to adhere to the currently accepted schedule may result in rejection of all or a portion of the progress payment until such time as the required schedule information is submitted and accepted by the City.

G. Delays to the Critical Path – Whenever it becomes apparent from the monthly CPM schedule update that delays to the Critical Path have occurred due to action or inaction of the Contractor and, as a result, the date for Substantial Completion will not be met, the Contractor must promptly take some or all of the following actions at no additional cost to the City, unless otherwise directed by the City:

1. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of Work.

2. Increase the number of working hours per shift, shifts per day, or Work Days per week; the amount of construction equipment; the forms for concrete work; etc., or any combination of the foregoing to substantially eliminate the backlog of Work.

3. Reschedule Activities to achieve maximum practical concurrence of accomplishment of Activities and comply with the revised schedule.

4. Submit to the City for review a written statement of the steps the Contractor intends to take to remove or arrest the delay to the schedule.

5. Add to its equipment and materials or construction forces, as well as increase the working hours, if operations for critical, less critical or non-critical Activities fall behind the Contractor's Baseline Schedule at any time during the construction period.

H. The City may, at any time during the Project and at no additional cost to the City, require the Contractor to develop a more detailed schedule/ Fragnet than depicted in the Baseline Schedule to provide a clearer understanding of the effort needed to complete an Activity or group of Activities.

I. If the City determines that either the Critical Path is in the negative by four (4) weeks, or that the Project's date for completion may be affected, the Contractor may be required, at no additional cost to the City, to prepare a Recovery Schedule. Such Recovery Schedule is subject to review and acceptance by the City.

1. The recovery schedule must propose alternative methods, overtime, and other means available to the Contractor to recover the delays incurred to date.

2. The Recovery Schedule must be resource-loaded with manpower and equipment required to bring the date for Substantial Completion back into compliance.

J. The Contractor must submit an "As-Built Schedule", as the last schedule update showing all Activities, with the exception of punch list and closeout tasks, at Substantial Completion. This schedule must reflect the exact manner in which the Project was actually constructed.

1.14 TIME IMPACT ANALYSIS:

A. In addition to the requirements of the Standard Construction Contract Article 11, the Contractor must submit a Time Impact Analysis to the Commissioner with all requests for time extension.

B. The Time Impact Analysis must include a written narrative and supporting impact schedule Fragnet detailing the Project delays resulting from the alleged delay. The impact schedule Fragnet, separate and distinct from the Progress Schedule update, must demonstrate that the changes or anticipated delays affect Activities of the current accepted Progress Schedule. The impact schedule will be incorporated into the Progress Schedule only after it is accepted by the Commissioner and a time extension is approved. The Fragnet submitted as part of the Time Impact Analysis must illustrate the impact of these changes or delays on the date for Substantial Completion.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 32 16.20

SECTION 01 32 16.30
PROJECT SCHEDULES (METHOD C)

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 32 16.30

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes the following:

1. Methods
2. Definitions
3. Preliminary, Baseline, and Project Schedule Preparation Timeline
4. Preliminary Project Schedule Development
5. Project Schedule
6. Activity and Calendar Coding Structure
7. Work Breakdown Structure (WBS)
8. Major Milestones
9. Short (Three-Week) Interval/Two-Week Look-Ahead
10. Submittals
11. Project Schedule Updating
12. Time Impact Analysis

1.3 METHODS:

A. The Contractor must comply with Project schedule development and updating requirements as specified herein.

1. The Contractor must employ or retain the services of a Construction Scheduler with verifiable construction scheduling experience, subject to review and acceptance by the City. Upon request, the Contractor must provide the City with qualifications and experience of the proposed scheduling staff member(s).

2. The Contractor must prepare, update, and maintain a detailed Project Schedule using a version of scheduling software that is compatible with the City's Oracle Primavera P6 Enterprise Project Portfolio Management (EPPM). All schedule submittals must be developed using Oracle's Primavera P6 EPPM software. Schedules must be developed using accepted CPM techniques using the Precedence Diagramming Method (PDM). The Project Schedule must be developed following Defense Contract Management Agency (DCMA), and American Association of Cost Engineering International (AACE International) guidance. The Contractor will be required to use the Contractor's own P6 license (whether single-user or Enterprise

license), unless otherwise directed by the Commissioner. If directed by the Commissioner prior to the Notice to Proceed (NTP), the Contractor must use the Department's P6 Enterprise license and develop the Progress Schedule within the Department's Enterprise environment.

3. Once the Baseline Schedule is accepted by the City, progress updates to the Project Schedule must be submitted monthly, unless otherwise directed by the City, until Substantial Completion. The Data Date for the schedule updates must use the last Friday of the month, or as directed by the City.

4. The Contractor must be responsible for providing the monthly schedule updates once the Baseline Schedule is approved. Each monthly schedule update must be accompanied with a schedule narrative that explains the following:

   a) The progress of work during that particular period of performance;
   b) Any changes in schedule Logic;
   c) The physical conditions that were used to update every Activities Percent Complete;
   d) Any change in actual Start and Finish Dates;
   e) Any Duration changes;
   f) Any added and deleted Activities; and
   g) Any added Extra Work (e.g., change orders).

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	**Definition**
Activity	A representation of a discrete portion of the overall scope of Work or an event through Duration and description in a CPM schedule.
Baseline Schedule	The planned and detailed CPM schedule of Activities, including all Logic, Durations, Resource and Cost Loading, and showing the entire scope of Work. The Baseline Schedule must be accepted by the City.
Critical Path	The longest sequence of Activities in a network which establishes the minimum length of time for accomplishment of the end event of the Project.
Critical Path Method (CPM)	A management technique used to plan and control a project which combines all relevant information into a single plan defining the sequence and Duration of operations and depicting the interrelationship of the Work elements required to complete the Project.
Current Schedule	The most recently updated schedule that captures progress to date and forecasts the dates for each Activity.
Data Date	The date used as a starting point for scheduling calculations. The Data Date is changed to the current end of period date when a schedule is updated for progress.

Term	Definition
Duration	The amount of time, in workdays, an Activity will take to perform.
Finish Date	The earliest estimated date an Activity is calculated to be complete, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.
Free Float	The calculated amount of time that the estimated start or finish of an Activity can be delayed without impacting the start or finish of other downstream Activities logically connected in a progressive relationship. (See Finish Date and Late Finish).
Fragnet	Fragmentary network: a portion of a schedule detailing impacts of an event on specific Activities in the broader schedule.
Inclement Weather	Any weather condition, the duration of which varies in excess of the 3-year average published by the National Oceanic and Atmospheric Administration (NOAA) information for the local area.
Integrated Project Schedule	The Commissioner's overall schedule covering design, procurement, and construction. The Commissioner will use the Contractor's Project Schedule to update the Integrated Project Schedule.
Late Finish	An estimate of the latest plausible date an Activity's completion can be postponed without rendering as unachievable the required completion of any downstream Milestones to which the Activity is Logically connected to in a progressive relationship.
Late Start	An estimate of the latest plausible date an Activity's start can be postponed without rendering as unachievable the required completion of any downstream Milestones to which the Activity is Logically connected to in a progressive relationship.
Logic	A direct progressive relationship between Activities where one Activity's performance restricts the performance of another Activity.
Milestone	A key or critical point in time for reference or measurement.
Network Diagram	A graphic diagram of a network schedule, showing Activities and Activity relationships.
Original Duration	The estimated amount of time, in Work Days, an Activity is expected to take to complete at the beginning of a project as anticipated by the Contractor based on its planned means and methods at time of bid and documented in the Baseline Schedule.
Percent Complete	The percentage of the scope of Work represented by an Activity completed as of the Data Date calculated as physical percent complete for payment purposes.

Term	Definition
Project Schedule	The Contractor's schedule used to manage the orderly and expeditious completion of the Work. The Project Schedule is initially the accepted Baseline Schedule, and is updated throughout the Project.
Remaining Duration	The amount of time, in Work Days, the remaining scope of Work represented by an Activity is expected to take to complete, measured from the current Data Date.
Resource and Cost Loading	Values assigned for estimated dollars, manpower, equipment and/or materials necessary to complete the scope of Work represented by a specific Activity.
Recovery Schedule	A Recovery Schedule outlining and incorporating extraordinary efforts required to recover lost time with the aim of achieving completion of the Project within the stipulated contract Duration, plus authorized time extensions. In such case, special attention must be given to minimize delays and must establish the nature of efforts; for instance, resources and equipment required, extended hours of work, weekend work, accelerated fabrication, required action(s) or effort(s) by the Contractor, its Subcontractors, consultants, clients, end users and/or other concerned parties to recover the schedule.
Revised and/or Updated Schedule	A Baseline Schedule, or Progress Project Schedule, or Recovery Schedule for the Project that shows the actual Duration of all the completed Activities, including Duration of and the reasons for delays, if any have occurred, AND revisions to all remaining Activities of the Contractor and its Subcontractors, including changes, if any, to logical ties, interrelations and the sequence of each of the outlined Activities. Any such revisions should be shown on the row just below the approved schedule of the respective Activity so that revisions can be compared. The Revised and/or updated Schedule must be reviewed and approved by the City.
Start Date	The earliest estimated date an Activity is calculated to begin, based on the estimated performance of all prior Activities to which the Activity is logically connected in a progressive relationship.
Time Impact Analysis	A forward looking (prospective) schedule analysis used to forecast the impact to the Critical Path and to Milestone Finish Dates caused by a single event or series of events. Time Impact Analysis is not a retrospective (forensic) schedule analysis or a what-if schedule analysis of a potential event.
Total Float	The amount of time the start or finish of an Activity can be delayed without affecting the Project completion date.

Term	Definition
Work Breakdown Structure (WBS)	WBS is a deliverable-oriented decomposition of a Project into smaller components. A WBS provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control.
Work Days (WD)	Work Days are every consecutive day on the calendar, excluding weekends (Saturday and Sunday) and holidays.

1.5 PRELIMINARY, BASELINE, AND PROJECT SCHEDULE PREPARATION TIMELINE:

A. Upon receipt of the NTP, the Contractor must promptly prepare a preliminary Project Schedule and subsequently a Baseline Schedule and must submit for the City's acceptance as follows:

1. Submit the Contractor's CPM Scheduler's qualifications to the City for approval within seven (7) Days after NTP. The City will respond to the submittal within seven (7) Days of the submittal receipt.
2. The preliminary Project Schedule must be submitted no later than twenty-one (21) Days after NTP.
3. The initial submittal of the Baseline Schedule must be provided to the City for review no later than forty-five (45) Days after NTP.
4. The Contractor must incorporate all corrections and revisions required by the City and provide an updated version of the Baseline Schedule for review and acceptance no later than seventy-five (75) Days after NTP to ensure that the Baseline Schedule is accepted no later than ninety (90) Days after the NTP. The ninety (90) Days must include fourteen (14) Days review time by the City for each submittal of the Baseline Schedule.
5. Once accepted, the Baseline Schedule will be the basis of Project Schedule updates.

B. Remedies

1. Preliminary Project Schedule: The City will take a credit of three thousand dollars ($3,000) if the preliminary Project Schedule is not submitted within twenty-one (21) Days of the NTP.
2. Acceptable Baseline Schedule: The City will take a credit of five thousand dollars ($5,000) if an acceptable Baseline Schedule is not submitted within ninety (90) Days of the NTP.
3. Monthly Progress Schedule updates: The City will take a credit of two thousand dollars ($2,000) for each schedule update not submitted within the period it was due.
4. Scheduling Firm Services: If an acceptable Baseline Schedule is not provided by the Contractor within ninety (90) Days of the NTP or three (3) updates are not provided by the Contractor during the period they are due, the City may engage the services of a scheduling firm to develop a Project schedule or update an existing schedule. The total costs of such services will be deducted from the monies due to the Contractor.
5. Any schedules and updates developed by such scheduling firm are for the City's sole use and do not, in any way, represent an acceptance of responsibility by the City to schedule the Work or relieve the Contractor of the obligation to complete the Work within the Durations specified by the Contract.

6. The City will only accept the submitted information after all corrections have been made and all issues have been resolved. The City may find the Contractor in default if items required by this Section are incomplete.

1.6 PRELIMINARY PROJECT SCHEDULE DEVELOPMENT:

A. The preliminary Project Schedule must be a detailed plan (division level per Construction Specifications Institute (CIS) MasterFormat) of all operations, including submittals, permitting, testing, and construction Activities, for either the first ninety (90) Days after NTP or to the point where the Contractor plans to mobilize on site (whichever is greater). This submittal will also depict a summary level (section level per CSI MasterFormat) schedule of the major Activities for the remainder of the Work.

B. The preliminary Project Schedule will be reviewed by the City and returned with comments, as necessary, within fourteen (14) Days of submittal receipt. Information from the preliminary Project Schedule will be the general foundation for development of the Baseline Schedule.

1.7 PROJECT SCHEDULE:

A. The Baseline Schedule must show the sequence in which the Contractor proposes to perform the Work, and account for all major and intermediate Milestone Activities, phasing, restrictions of access, availability of work areas and the availability and use of labor, materials, and equipment.

B. After the Baseline Schedule is approved, the Project Schedule must be the Contractor's working schedule and must be used to plan, organize, execute and track the Project. The Project Schedule is the primary vehicle used to report actual performance, progress, and convey the Contractor’s execution plan to complete the Work.

C. The Project Schedule must show the sequence in which the Contractor proposes to perform the Work, and account for all major and intermediate Milestone Activities, phasing, restrictions of access, availability of work areas and the availability and use of labor, materials, and equipment.

D. The Project Schedule must be the Contractor's working schedule used to plan, organize, execute, and track the Project. The Project Schedule is the primary vehicle used to report actual performance, progress, and convey the Contractor's execution plan to complete all remaining Work.

E. All delay claims must be based on the current approved updates of the Project Schedule.

F. The Contractor must confirm in writing that all Subcontractors performing any portion of the Work are in agreement with the accepted Baseline Schedule and the monthly updates.

G. The amount of detail represented in the Baseline and Project Schedule and supporting documents submitted must, at a minimum, include the following, items:

1. Contract Milestones must be identified and included in the Baseline and Project Schedule.
2. All submittal, owner review & approval, purchase, manufacture, and delivery Activities for all major materials and equipment.
3. Deliveries of owner-furnished equipment and/or materials.
4. Preparation, submittal, and approval of drawings, material samples, and safety plans.
5. Preparation, submittal, review, and approval of permits required by all regulatory agencies and other third parties.
6. Performance of tests, submission of test reports, and approval of test results.

7. Commissioning Activities for all commissioned systems and equipment is to be clearly delineated and scheduled such that they will be completed prior to Substantial Completion. Such Activities must include, at a minimum, Pre-Functional testing and check sheets; Testing, Adjusting, and Balancing (TAB) verification; Functional Testing, including testing of all controls; and Owner's demonstration and orientation.

8. Completion dates of all items required for phased completion (if applicable).

9. Completion dates of all items required for Substantial Completion.

10. Completion dates of all items required to obtain a Temporary Certificate of Occupancy (TCO) and Certificate of Occupancy (CO).

11. Completion dates for close-out of regulatory and punch list items prior to Final Acceptance and transfer of the Project.

12. Any additional detail requested by the Commissioner.

H. Activities identified in the Baseline and Project Schedule must have the Duration in units of whole Work Days. Construction Activity Durations must not exceed twenty (20) Work Days unless specifically approved by the City. This is to ensure that Activities are not generalized and that each Activity and sub-Activity are defined as narrowly as reasonable to facilitate schedule tracking. Durations for non-construction Activities such as procurement of materials, delivery of equipment, concrete curing, etc. may exceed twenty (20) Work Days without prior approval; however, these are still subject to review by the City. Durations must be based on the available resources required for performing each Activity and must be the result of definitive labor hours using established production rates, and with consideration of on-site working conditions. If requested by the City, the Contractor must justify the reasonableness of a planned Duration.

I. Activity descriptions must use plain language that clearly and uniquely defines each Activity. Each description must include a verb or work function (e.g. submit, form, pour etc.), an object (e.g. slab, foundation, etc.) and, for any construction Activities, a specific location. The Work related to each Activity must be limited to one responsibility and one trade.

J. Activity relationships must be assigned to clearly establish predecessor and successor relationships to each Activity. Open-ended Activities are not permitted with the exception of the first and last Activities in the network, the first Activity being NTP and the last being Final Acceptance. The use of relationship lag times is discouraged and only permitted with prior approval by the City. The use of negative lag is never permitted.

K. Activity constraint dates are only to be used to reflect contractual constraints unless specifically authorized by the City.

L. Float or slack, in any schedule, must not be for the exclusive use or benefit of either the City or the Contractor, but must be available for use by both the City and the Contractor.

M. Each resubmittal after the Project Schedule is delivered for acceptance must comply with all requirements of this section. Review and response by the City will be given within fourteen (14) Days after resubmission. The Contractor's receipt of the comments within the time specified must not, in any way, affect the Contractor's responsibility to complete the Project within the time fixed in Schedule A.

N. Failure by the City to return comments or indicate acceptance status will in no way relieve the Contractor's obligation to submit monthly schedule updates.

O. At the request of the City, the Contractor must be required to make a presentation to explain or clarify the intended logical sequence of construction Activities depicted in the detailed Project Schedule. The Contractor and designated scheduler must discuss anticipated challenges and outline construction methodology and flow of work to show how and when major Milestones will be achieved. In addition,

the Contractor may, at no cost to the City, be required to participate in additional Project meetings necessary to obtain acceptance of the above-noted submittals.

P. The Contractor must provide a Cost Flow Projection (CFP) summary covering from NTP to Final Acceptance. The CFP summary must match the expected billings for each period of performance.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.7.Q

Q. Schedule Cost and Resource Loading

1. At the direction of the City, and at no additional cost to the City, a Project Schedule must be cost loaded within thirty (30) Days after acceptance of the Baseline Schedule.
2. The Contractor must accurately load all Project Activities with direct field labor associated with the craft or trades required to complete that Activity. All labor must be noted in manhours required to complete the tasking. The Contractor must include in all Activities the hours required of for major pieces of equipment.
3. All Resource ID's must have a unique identifier assigned by the Contractor, and approved by the City, so the Project-specific data can be separated from other data in the system.
4. Cost loading must be accomplished by adding a single summary level cost loaded Activity in the Project Schedule. This Activity will allow initial generation and monthly updates of the planned value that is time-phased into monthly periods.
5. The intent of the cost loading is to facilitate cost forecasting, tracking, and reporting of monthly cost projection. Every month, the cost loaded summary Activity must be updated with earned value for prior months and revised monthly forecast for future periods. If there is a significant difference between the actual cumulative monthly invoice and the cumulative planned value from the cost loaded Project Schedule for any reporting month, the Contractor must provide the City with the reason for variance in the schedule narrative.

1.8 ACTIVITY AND CALENDAR CODING STRUCTURE:

A. The Baseline and Project Schedules must contain a sufficient number of Activities to represent adequate planning and execution of the Work so that it shows an accurate flow of work and demonstrates an understanding of the Project by the Contractor.

B. Activity ID and Calendar Coding

1. The Contractor's proposed Activity and calendar coding and must be submitted with the preliminary Project Schedule. A meeting may be requested by the City to discuss the scheme and other schedule information prior to the submittal of the Project Schedule. The accepted coding scheme and WBS Structure must be incorporated into the Project Schedule.

C. Activity ID Coding

1. All Activities/Resources/Calendars (Baseline and Project Schedules) must be coded inside the P6 Project Environment / Project Level (NOT the Global Environment/Enterprise Level) to facilitate selection, sorting and preparation of reports.
2. Activity coding must consist of the Project ID followed by a dash, followed by Activity coding (PROJECT ID-ACTIVITY CODE). Activity codes must be created at the Project level and must utilize the coding scheme outlined in the table below:

Activity Code	Meaning
RESP	Responsibility: Identify the party (e.g. Contractor, Subcontractor, City, etc.) responsible for the Activity.
PHAS	Phase: Breakdown of Activities in Milestones, pre-construction, procurement, construction and close-out Activities.
LOCN	Location: Breakdown by floor or elevation.
AREA	Area: Breakdown by room, area, block or wing. May be used as a subdivision of PHAS to include Milestones, permits, Subcontractor approvals, submittals, fabrication and delivery, and subdivision of the Site and buildings into Logical modules, such as by blocks, wings, etc.
TRAD	Trade: Breakdown by CSI Code or section number in the Specifications.

a. Description of schedule Activities must include terminology that represents the scope of work associated with that particular Activity. Terminology used to describe similar actions must be consistent across all segments of work.

b. Naming convention for schedule Activities must be descriptive and indicate the associated work covered by the Activity. Activities must use a verb, noun, and location of the work in the Activity name.

3. Project Calendar Coding

a. All calendars created and assigned to Activities must be Project-level calendars. The Calendar Name must consist of the Project ID number followed by a dash, followed by a descriptive Calendar Name (PROJECT ID-CALENDAR NAME).

1.9 WORK BREAKDOWN STRUCTURE:

A. A multi-level hierarchal WBS must be incorporated in all P6 schedules. An initial, proposed WBS must be submitted with the preliminary Project Schedule. The levels (nodes) must include, but not be limited to:

1. LEVEL 01 – The Project Level.
2. LEVEL 02 – Contains a minimum of four (4) nodes: Pre-Construction, Procurement, Construction or Phase of Construction, and Closeout.
3. LEVEL 03 – Decomposition of each of the four (4) nodes in Level 02 into its constituent parts. This Level must target specific, tangible, scopes of the Project Work.
4. LEVEL 04 – Decomposition of Level 03 Activities providing work package details that provide an understanding of the process to be used to execute the Project Work.

B. The Contractor's proposed WBS must be submitted with the preliminary Project Schedule. The accepted WBS must be incorporated into the Baseline and Project Schedule.

1.10 MAJOR MILESTONES:

A. The schedule must include both contractual and non-contractual Milestones that are provided by the City. These Milestones must be properly associated with the related Work and maintained to represent the progress of the Project and account for all required inspections and approvals to achieve project completion.

1.11 SHORT (THREE-WEEK) INTERVAL / TWO-WEEK LOOK-AHEAD:

A. On a weekly basis, the Contractor must provide a three (3) week short interval schedule in a format satisfactory to the City. The purpose of this schedule is to report the actual progress of the past week against the previous short interval look-ahead Activities and add any additional Activities planned for the next two (2) weeks. Electronic and hard copies must be provided to the City on the first day of each work week with the prior week's actual progress included.

B. Each task listed on the short interval schedule must be representative of the most current Project Schedule Update and include a reference to an Activity shown on the current update.

C. The short interval schedule must list all required DDC coordinated activities, including special inspections.

1.12 SUBMITTALS:

A. General

1. Development of the Baseline Schedule and updating of the Project Schedule must follow the DCMA and AACE International guidelines.

2. Each electronic submission of the Project Schedule must be assigned a unique file name consisting of the Project ID (as noted on the NTP), followed by a dash followed by a unique file name clearly marked (i.e. ProjID- B000 = B/L rev0, ProjID-B001 = B/L rev01 etc.) to indicate the specific submission. Similarly, update submittals must be named ProjID-Uxxx where xxx is a sequential number, starting with 001, indicating the revision or issue number.

3. The Contractor must provide all submittals in electronic format and two hard copies.

B. Preliminary Project Schedule

1. For acceptance of the preliminary Project Schedule, the Contractor must submit the following:

a. Two (2) 11" x 17" hard copies of the proposed preliminary Project Schedule, as well as the native electronic schedule data file, in .XER file format, per the direction of the City.

b. A Schedule Narrative Report detailing the Contractor's initial plan for executing the Contract work within the allotted Contract Duration, and include the following explanation of their provided preliminary schedule:

i. The proposed (WBS);
ii. All proposed Project Calendars;
iii. All proposed Activity Codes, clearly defined;
iv. The proposed Activity ID format; and
v. Schedule basis narrative, which must memorialize the assumptions made in the development of the schedule.

C. Baseline Schedule

1. The City will return comments within ten (10) Work Days after receipt of the initial Project Schedule Submission. If any of the required submissions are returned to the Contractor for corrections or revisions, they must be resubmitted within five (5) Work Days from receipt of comments. Each resubmittal must comply with the requirements enumerated above. Review and response by the City will be given within ten (10) Work Days after resubmission.

2. At the request of the City, the Contractor will be required to participate in Project meetings necessary to obtain an acceptance of the above noted submittals.

3. Baseline schedule must include the actual schedule for the initiation, procurement, submittal, permit, construction activity, inspection, substantial and final completion, and closeout phases. Schedule performance during construction and closeout is measured against this baseline.

4. The project may be re-baseline only if the project experiences significant change in the scope, cost and / or schedule due to extenuating circumstances and reasons beyond the control of MC. Commissioner approval is required to re-baseline a project.

5. Baseline Schedule submittal must contain a Narrative Report. It must include the following, or as directed by the City:

   a. A description of the Project scope and how the Work is represented in the schedule Activities;

   b. A description of the overall sequence of major components of Work;

   c. Planned work week for each definable feature of work.

   d. Description of the Critical Path and near Critical Paths;

   e. Basis of Durations, described in terms of quantity and production rate;

   f. How weather will be accommodated in the schedule, including a description of the weather calendar and the Activities it is applied to, and the NOAA Inclement Weather data that defined the number of non-work days;

   g. How regulatory, operational or third-party constraints are accommodated in the schedule;

   h. Description of key Project coordination points or events;

   i. Discussion of long lead items and basis of time frames for submittals;

   j. Description of anticipated means and methods for large quantity production Activities;

   k. Potential opportunities and risks, including quantification of the schedule reduction or expansion; and

   l. Assumptions/exclusions made in the schedule.

   m. Permits, and if required, FDNY Sign-off, TCO & CO approval to ensure regulatory acceptance and conditions for occupancy.

D. Project Schedule Updates

1. Every schedule submittal must be provided with a corresponding narrative. These schedule submittals and narratives must be submitted in hard copy and the native electronic format as attachments to emails or other media accepted by the City. When opened, the electronic format must provide flawless restoration of the native files (P6 (.XER) for Primavera schedule files and MS Word and/or Adobe Acrobat for narrative and supporting document submittals).

2. For each submittal of the updated Project Schedule, the following layouts, reports, and graphics are required in the specified formats, unless otherwise directed by the City:

   a. The Contractor must furnish two (2) 11” x 17” hard copies of the complete progress schedule with each initial schedule update and final update incorporating comments furnished by the City. Additionally, the Contractor must provide the native electronic schedule data file, in .XER file format with the initial and final schedule update submission.

b. An Activity bar chart Layout grouped by Activity Code and then sorted by Start Date, Finish Date, and Total Float.

c. Each Activity line must display the Activity ID (Act ID), Description (Name), Original Duration (OD), Remaining Duration (RD), Start Date (ES), Finish Date (EF), and Total Float (TF), Baseline Original Duration (BL OD), Baseline Start (BL Start), Baseline Finish (BL Fin), Baseline Total Float (BL TF).

d. An Activities progress bar must show both current progress update ES and EF, and baseline ES and EF. The top line of the bar chart area must contain the updated ES and EF; the second line below must depict the accepted baseline ES and EF dates.

3. The City may request additional standard P6 reports from time to time at no additional cost.

4. The Monthly Update submittal must contain a Narrative Report. It must include the following, or as directed by the City:

a. Any changes to the schedule basis narrative;

b. Overall health of the Project;

c. Actual Activity Start Dates;

d. Actual Activity Finish Dates;

e. The physical conditions that were used to update Activities percent complete

f. Percent of Work reported in place;

g. Contract and Milestone completion date status:

i. Number of Days ahead or behind schedule; and
ii. Days lost/gained compared with the previous update.

h. Schedule change report organized by Milestone and area comparing the number of Activities that were planned to start and finish to the number that actually started and finished for the reporting period;

i. Lookahead report listing each Activity in the CPM schedule that is scheduled to be performed during the next reporting period;

j. Plans for executing scheduled Activities during the next reporting period;

k. Analysis, organized by Milestone and area, of the Critical Path and near Critical Path(s) describing:

i. The nature of the Critical Path/near Critical Path;
ii. Impact on other Activities, Milestones and Finish dates; and
iii. Identify, or update, risks and opportunities that may impact the Critical Path/near Critical Paths.

l. List of current and anticipated delays by Milestone:

i. Cause of the delay;
ii. Corrective actions and schedule adjustments to correct the delay;
iii. Impact of the delay on other Activities, Milestones and completion dates; and
iv. Weather delays, when applicable. The Contractor must describe how the impacts of weather conditions and constraints were absorbed and accounted for in the schedule.

m. Changes in Activity description, Logic, or Duration must be submitted as a separate Proposed Schedule and approved by the City prior to being submitted as an official

update. Once allowed, said changes must be grouped and organized in the report in a manner that communicates in detail the rationale associated with each change and the impact upon construction sequence, relationships and the Critical Path. A standard Digger Report is not sufficient to meet this requirement;

n. Added/deleted Activities and the rationale associated with each action;

o. Pending issues and status of other items;

p. Permits, in a tabular format, showing the status and change in status of all permits;

q. Contract modifications;

r. Current and potential extra Work, including change orders;

s. Status of long lead procurement items and whether the item is on the Critical Path;

t. Status of Project submittals;

u. Out of sequence report describing the necessity of each Activity relationship shown therein, as described within this Section;

v. Illogical progress/restraint reports (if any);

w. Other Project or scheduling concerns;

x. Electronic copy of the latest CPM schedule update file in Primavera (.XER) format; and

y. Primavera scheduling error report.

1.13 PROJECT SCHEDULE UPDATING:

A. The initial updating must take place immediately after the City accepts the Contractor's Baseline Schedule. The Data Date for the first update must not exceed seven (7) Days from the date of receipt of the accepted Baseline Schedule, or as directed by the City.

B. Subsequent updates to the Project Schedule must be submitted monthly until Substantial Completion is achieved. The schedule Data Date must be set to the last Work Day of the period unless otherwise directed by the City. Updates must be provided to the City no later than seven (7) Days after the 'schedule Data Date'.

C. Updates must reflect actual or reasonably anticipated progress as of the last Work Day of the period.

D. The City may request meetings with the Contractor to review the Project Schedule and narrative and jointly verify Project health and information.

E. In addition, the City may request meetings with the Contractor's scheduling representative to:

1. Resolve out-of-sequence Logic.

2. Should out-of-sequence progress occur where Activities have reported progress without predecessor Activities being completed, the Contractor must obtain the City's approval in a Proposed Schedule before revising the Logic ties to reflect the way the Work is actually being performed. Use of progress override by default mechanisms that may be included in CPM scheduling software systems will not be allowed except on a case-by-case basis with the approval of the City. A written explanation for each instance must be included in the monthly submittal narrative.

3. Assess the impact, if any, of any pending change orders.

4. Incorporate accepted time extensions.

5. Review revised Logic (as-built and projected) and changes in Duration, cost, and labor hours assigned.

F. Contractor's failure to provide required scheduling information within the required timeframe or to adhere to the currently accepted schedule may result in rejection of all or a portion of the progress payment until such time as the required schedule information is submitted and accepted by the City.

G. Delays to the Critical Path – Whenever it becomes apparent from the monthly CPM schedule update that delays to the Critical Path have occurred due to action or inaction of the Contractor, and as a result the date for Substantial Completion will not be met, the Contractor must promptly take some or all of the following actions at no additional cost to the City, unless otherwise directed by the City:

1. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of Work.
2. Increase the number of working hours per shift, shifts per day, or Work Days per week; the amount of construction equipment; the forms for concrete work; etc., or any combination of the foregoing to substantially eliminate the backlog of Work.
3. Reschedule Activities to achieve maximum resource utilization across the Project and comply with the revised schedule.
4. Submit to the City a written statement of the steps the Contractor intends to take to remove or arrest the delay to the schedule. The Contractor must promptly provide the necessary level of effort to bring the Work back on schedule.
5. Add to its equipment and materials or construction forces, as well as increase the working hours, if operations for critical, less critical, or non-critical Activities fall behind the Contractor's Baseline Schedule at any time during the construction period.

H. The City may, at any time during the Project and at no additional cost to the City, require the Contractor to develop a more detailed schedule/Fragnet than depicted in the Baseline Schedule to provide a clearer understanding of the effort needed to complete an Activity or group of Activities.

I. If the City determines that either the Critical Path is in the negative by four (4) weeks, or that the Project's date for completion may be affected, the Contractor may be required, at no additional cost to the City, to prepare a Recovery Schedule. Such Recovery Schedule is subject to review and acceptance by the City. The Recovery Schedule must propose alternative methods, overtime, and other means available to the Contractor to recover the delays incurred to date.

J. The Contractor must submit an "As-Built Schedule", as the last schedule update showing all Activities, with the exception of punch list and closeout tasks, at Substantial Completion. This schedule must reflect the exact manner in which the Project was actually constructed.

1.14 TIME IMPACT ANALYSIS:

A. In addition to the requirements of the Standard Construction Contract Article 11, the Contractor must submit a Time Impact Analysis to the Commissioner with all requests for time extension.

B. The Time Impact Analysis must include a written narrative and supporting impact schedule Fragnet detailing the Project delays resulting from the alleged delay. The impact schedule Fragnet, separate and distinct from the Progress Schedule update, must demonstrate that the changes or anticipated delays affect Activities of the current accepted Progress Schedule. The impact schedule will be incorporated into the Progress Schedule only after it is accepted by the Commissioner and a time extension is approved. The Fragnet submitted as part of the Time Impact Analysis must illustrate the impact of these changes or delays on the date for Substantial Completion.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 32 16.30

SECTION 01 32 33
PHOTOGRAPHIC DOCUMENTATION

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SECTION 01 32 33

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section includes the following:
1. Photographic Media
2. Construction Photographs
3. Pre-construction Photographs
4. Periodic Construction Progress Photographs
5. Special Photographs
6. DVD Recordings
7. Final Completion Construction Photographs

B. RELATED SECTIONS: include without limitation the following:
1. Section 01 10 00 SUMMARY
2. Section 01 33 00 SUBMITTAL PROCEDURES
3. Section 01 35 91 HISTORIC TREATMENT PROCEDURES
4. Section 01 78 39 CONTRACT RECORD DOCUMENTS
5. Section 01 81 19 INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS

C. PHOTOGRAPHER - The Contractor must employ and pay for the services of a professional photographer who will take photographs showing the progress of the Work.

1.3 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: “Design Consultant” must mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the “Design Consultant” may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.4 SUBMITTALS:

A. Qualification Data: For photographer.

B. Key Plan: With each Progress Photograph Submittal include a key plan of Project site and building with notation of vantage points marked for location and direction of each image. Indicate location, elevation or story of construction. Include same label information as corresponding set of photographs.

C. Construction Progress Photograph Prints: Take Progress Photographs bi-weekly and submit four (4) color prints of each photographic view for each trade to the Commissioner. Such Progress Photographs must be included in each monthly progress report or as otherwise directed by the Commissioner.

D. Digital Files: Submit digital files in the format required.

1.5 QUALITY ASSURANCE:

A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three (3) years.

1.6 COORDINATION:

A. The Contractor and its Subcontractor(s) must cooperate with the photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, such as temporary lighting required to produce clear and well-lit photographs without obscuring shadows.

1.7 COPYRIGHT:

A. The Contractor must include the provisions of this Subsection 1.7 in the agreement between the Contractor and the Photographer who will provide the construction photographs described in this Section. The Contractor must submit to the Commissioner a copy of its agreement with the Photographer.

B. Any photographs, images and/or other materials produced pursuant to this Agreement, and any and all drafts and/or other preliminary materials in any format related to such items produced pursuant to this Agreement, will, upon their creation, become the exclusive property of the City.

C. Any photographs, images and/or other materials provided pursuant to this Agreement ("Copyrightable Materials") will be considered "work-made-for-hire" within the meaning and purview of Section 101 of the United States Copyright Act, 17 U.S.C. § 101, and the City will be the copyright owner thereof and of all aspects, elements and components thereof in which copyright protection might exist. To the extent that the Copyrightable Materials do not qualify as "work-made-for-hire," the Photographer hereby irrevocably transfers, assigns and conveys exclusive copyright ownership in and to the Copyrightable Materials to the City, free and clear of any liens, claims, or other encumbrances. The Photographer will retain no copyright or intellectual property interest in the Copyrightable Materials. The Copyrightable Materials must be used by the Photographer for no purpose other than in the performance of this Agreement without the prior written permission of the City. The Department may grant the Photographer a license to use the Copyrightable Materials on such terms as determined by the Department and set forth in the license.

D. The Photographer acknowledges that the City may, in its sole discretion, register copyright in the Copyrightable Materials with the United States Copyright Office or any other government agency authorized to grant copyright registrations. The Photographer must fully cooperate in this effort and agrees to provide any and all documentation necessary to accomplish this.

E. The Photographer represents and warrants that the Copyrightable Materials: (i) are wholly original material not published elsewhere (except for material that is in the public domain); (ii) do not violate any copyright Law; (iii) do not constitute defamation or invasion of the right of privacy or publicity; and (iv) are not an infringement, of any kind, of the rights of any third party. To the extent that the Copyrightable Materials incorporate any non-original material, the Photographer has obtained all necessary permissions and clearances, in writing, for the use of such non-original material under this Agreement, copies of which must be provided to the City.

PART II – PRODUCTS

2.1 PHOTOGRAPHIC MEDIA:

A. Digital Images: Digital files must be captured as 7.2 megapixel files or greater, with a minimum pixel array of 2,400 pixels by 3,000 pixels. The camera used to capture the digital files must be a Digital SLR (Single Lens Reflex) camera or approved equal; "point and shoot" cameras or camera phones are not acceptable. Digital cameras must produce images using true optical resolution; "digital zoom" is not acceptable. Images must not be resized or interpolated. The file format for digital files must be Joint Photographic Experts Group format ("JPG"). The digital files must not be modified or processed in any way to alter the JPG file's metadata, including the photograph's original capture date.

B. Digital Files: Digital files must be submitted on Digital Versatile Disk ("DVD") or as specified by the Commissioner. DVDs must be inserted in standard weight Archival Quality clear poly sheet protectors and submitted in a hard cover three (3) ring binder. The information imprinted on each print must be provided on an Excel file included on the DVD. The DVD must be labeled with the Project ID and the Project description. Labeling using adhesive labels is not acceptable.

C. Prints:
   1. Format: 8-by-10-inch (203-by-254-mm) smooth-surface matte color prints on single-weight commercial-grade stock paper, with 1-inch wide margins and punched for standard 3-ring binder.
   2. Identification: On the front of each photograph affix a label in the margin with Project name and date photograph was taken. On the back of each print, provide an applied label or rubber-stamped impression with the following information:
      a. Project Contract I.D. Number.
      b. Project Contract Name.
      c. Name of Contractor. (and Subcontractor Trade Represented)
      d. Subject of Image Taken.
      e. Date and time photograph was taken if not date stamped by camera.
      f. Description of vantage point, indicating location, direction and other pertinent information.
      g. Unique sequential identifier.
      h. Name and address of photographer.

PART III – EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS:

A. General: Take photographs that provide the largest possible depth-of-field while still in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
   1. Maintain key plan with each set of construction photographs that identifies each photographic location and direction of view.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
   1. Date and Time: Include date and time in filename for each image.
   2. Field Office Images: Maintain one set of images on USB drive, or other electronic media requested by the Commissioner, in the field office at the Project site so that it is available at all times for reference. Ensure that the images are the same as for those submitted to Commissioner.

3.2 PRE-CONSTRUCTION & PRE-DEMOLITION PHOTOGRAPHS:

A. Before commencement of Contract Work at the Project site, take color photographs of Project site and surrounding properties, including existing structures or items to remain during construction, from different vantage points, as directed by the Commissioner.
   1. Flag applicable excavation areas and construction limits before taking construction photographs.

2. Take photographs of minimum eight (8) views to show existing conditions adjacent to property before starting the Work.
3. Take applicable photographs of minimum eight (8) views of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
4. Take additional photographs as required or directed by the Commissioner to record settlement or cracking of adjacent structures, pavements, and improvements.

B. Demolition Operations: Take photographs as directed by the Commissioner of minimum of eight (8) views each before commencement of demolition operations, at mid-point of operations and at completion of operations.

C. Pre-Demolition Photographs: Take archival quality color photographs, to include all exterior building facades, of all structures at the Project site designated to be fully demolished or removed in compliance with New York City Building Code requirements. Submit four (4) complete sets of pre-demolition photographs, in the format specified herein, to the Commissioner for submission to the New York City Department of Buildings.

3.3 PERIODIC CONSTRUCTION PROGRESS PHOTOGRAPHS:

A. Take photographs of minimum eight (8) views bi-weekly as directed by the Commissioner of construction progress for each contract trade. Select vantage points to show status of construction and progress since last photographs were taken.

3.4 SPECIAL PHOTOGRAPHS:

A. The photographer must take special photographs of subject matter or events as specified in other sections of the Project Specifications from vantage points specified or as otherwise directed by the Commissioner.

B. Historical Elements: As required in Section 01 35 91 HISTORIC TREATMENT PROCEDURES, for Contract Work at designated landmark structures or sites, the photographer, as specified and required by individual sections of the Contract documents or at the direction of the Commissioner, must take images of existing elements scheduled to be removed for replacement, repair or replication in quantities as directed, including post-construction photographs of completed Work as directed by the Commissioner.

1. Take Presentation Quality Photographs of designated landmark structures as directed by the Commissioner for submission to the New York City Landmarks Preservation Commission. Provide a minimum of four (4) color photographic prints of each view as directed.

3.5 VIDEO RECORDING:

A. When Video Recording of Demonstration and Orientation sessions is required, the Contractor must provide the services of a Videographer as indicated in Section 01 79 00 DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION.

3.6 FINAL COMPLETION CONSTRUCTION PHOTOGRAPHS:

A. For submission as Project Record Documents, take color photographs of minimum eight (8) unobstructed views of the completed Project and/or Project site, as directed by the Commissioner and after all scaffolding, hoists, shanties, field offices or other temporary work has been removed and final cleaning has been done after date of Substantial Completion. Submit four (4) sets of each view of Presentation Quality photographic prints, including negatives and/or digital images electronic file.

END OF SECTION 01 32 33

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART I – GENERAL:

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Coordination Drawings, Catalogue Cuts, Material Samples, and other Submittals required by the Contract Documents.

B. Review of Submittals does not relieve the Contractor of responsibility for any Contractor's errors or omissions in such Submittals, nor from responsibility for complying with the requirements of the Contract.

C. Responsibility of the Contractor: The approval of Shop Drawings will be general and will not relieve the Contractor of the following responsibilities:
   1. Accuracy of such Shop Drawings;
   2. Proper fitting and construction of the Work
   3. Furnishing of materials or Work required by the Contract that may not be indicated on the Shop Drawings.

D. Approval of Shop Drawings must not be construed as approving departures from the Contract Drawings, Supplementary Drawings, or Specifications.

E. This Section includes the following:
   1. Definitions
   2. Submission Procedures
   3. Coordination Drawings
   4. LEED Submittals
   5. Ultra Low Sulfur Diesel Fuel Reporting
   6. Construction Photographs and Recordings
   7. As-Built Documents

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION
C. Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION
D. Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION
E. Section 01 40 00 QUALITY REQUIREMENTS
F. Section 01 77 00 CLOSEOUT PROCEDURES
G. Section 01 78 39 CONTRACT RECORD DOCUMENTS
H. Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS
I. Section 01 81 13.10 ENVIRONMENTALLY PREFERABLE PURCHASING (EPP) COMPLIANCE

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: "Design Consultant" must mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and Specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

C. Action Submittals: Written and graphic information, or physical samples that require responsive actions and include, without limitation, all Shop Drawings, product data, letters of certification, tests and other information required for quality control and as required by the Contract Documents.

D. Informational Submittals: Written and graphic information that does not require responsive action. Informational Submittals may be rejected for non-compliance with the Contract.

E. Shop Drawings: Drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data, except for coordination drawings, specifically prepared for the Project by the Contractor or any Subcontractor, manufacturer, supplier or distributor, which illustrates how specific portions of the Work must be fabricated and/or installed.

F. Coordination Drawings: As required in Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION.

G. Product Data and Quality Assurance Submittals: Includes manufacturer's standard catalogs, pamphlets, and other printed materials including without limitation the following:

1. Catalogue and Product specifications
2. Installation instructions
3. Color charts
4. Catalog cuts
5. Rough-in diagrams and templates
6. Wiring diagrams
7. Performance curves
8. Operational range diagrams
9. Mill reports
10. Design data and calculations
11. Certification of compliance or conformance
12. Manufacturer's instructions and field reports

1.5 COORDINATION DRAWINGS:

A. Coordination Drawings, General: When coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity, or where limited space availability necessitates coordination, prepare Coordination Drawings according to requirements in individual Sections as a prerequisite to submittal of Shop Drawings.

1. Content: Project-specific information, shown accurately to a scale large enough to indicate and

resolve conflicts. Do not base Coordination Drawings on standard printed data. Include the following information, as applicable for the Project:

a. Use applicable background views as a basis for preparation of coordination layouts. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
b. Coordinate the addition of trade-specific information by multiple contractors in a sequence that best presents the information and resolution of conflicts between installed components, before submitting for review.
c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, plumbing, fire protection, and electrical systems.
d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f. Indicate required installation sequences.
g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Commissioner indicating proposed resolution of such conflicts.

B. Coordination Drawing Organization: Organize Coordination Drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling raised access floor and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide Coordination Drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

   a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
   b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
   c. Fire-rated enclosures around ductwork.
   d. HVAC equipment

7. Electrical Work: Show the following:

   a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
   b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
   c. Panel board, switch board, switchgear, transformer, busway, generator, and motor-control center locations.
   d. Location of pull boxes and junction boxes, dimensioned from column center lines.
   e. Indicate runs and locations of Audio Visual and Information Technology, and

security devices.

8. Fire-Protection System: Show the following:

   a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

C. The Contractor must issue the completed Coordination Drawing(s) to the Design Consultant for his/her review. The Design Consultant may call as many meetings as necessary with the Contractor, including attendance by applicable Subcontractors, and may call on the services of the applicable sub consultant(s) where necessary, to resolve any conflicts that become apparent.

D. Upon resolution of any conflicts, the Contractor must provide a final Coordination Drawing(s) which will become the Master Coordination Drawing(s). The Master Coordination Drawing(s) must be signed and dated by the Contractor to indicate acceptance of the arrangement of the Work.

E. A reproducible copy of the Master Coordination Drawing(s) must be provided by the Contractor to each of the appropriate Subcontractor(s), the Resident Engineer and the Design Consultant for information.

F. Shop Drawings must not be submitted prior to acceptance of the final coordinated drawings and must be prepared in accordance with the Master Coordination Drawing(s). No work will be permitted without accepted Shop Drawings. It is therefore essential that this procedure be instituted as quickly as possible.

G. Coordination Drawing Digital Data Files: Prepare coordination digital data files according to the following requirements:

   1. File Preparation Format: Same digital data software program, version, and operating system as original Design Drawings.
   2. File Submittal Format: Submit or post coordination drawing files using PDF format.
   3. BIM File Incorporation: Submit or post coordination drawing files using PDF format, unless otherwise directed by Commissioner.
   4. Commissioner will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.

      a. Contractor must execute Digital Data File Release and indemnification form provided by Commissioner.
      b. Commissioner makes no representations as to the accuracy or completeness of digital data files as they relate to coordination drawings.

1.6 SUBMITTAL PROCEDURES:

A. Refer to Section 01 35 03 GENERAL MECHANICAL REQUIREMENTS and Section 01 35 06 GENERAL ELECTRICAL REQUIREMENTS for additional Submittal requirements involving electrical and mechanical work or equipment of any nature called for in the Project.

B. Coordination: Coordinate preparation and processing of Submittals with performance of construction activities.

   1. Coordinate each Submittal with fabrication, purchasing, testing, delivery, other Submittals, and related activities that require sequential activities, with the Submittal Schedule specified in Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION.
   2. Coordinate transmittal of different types of Submittals for related parts of the Work so processing will not be delayed because of need to review Submittals concurrently for coordination.
   3. The Commissioner reserves the right to withhold action on a Submittal requiring coordination with other Submittals until related Submittals are received.

C. Identification: Place a permanent label or title block on each Submittal for identification.

   1. Indicate name of firm or entity that prepared each Submittal on label or title block.

2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Design Consultant.

3. Include the following minimum information on label for processing and recording action taken:
   a. Project name, DDC Project Number, and Contract Number
   b. Date
   c. Name and address of Design Consultant
   d. Name and address of Contractor
   e. Name and address of Subcontractor
   f. Name and address of supplier
   g. Name of manufacturer
   h. Submittal number or other unique identifier, including revision identifier
   i. Number and title of appropriate Specification Section
   j. Drawing number and detail references, as appropriate
   k. Location(s) where product is to be installed, as appropriate
   l. Other necessary identification

D. PDF Submittals:

1. Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number. Bind transmittal form with each submittal file package. Transmittal form must be the first page in the PDF file constituting the submittal.

2. Submittal files received from sources other than the Contractor will be rejected without review. Re-submission of the same drawings or product data must bear the original number of the prior submission and the original titles.

E. Web-Based Project Software Submittals: Prepare submittals as PDF files, or other format indicated by Project software website.

F. Transmittal Form: Provide locations on form for the following information:

1. Project name, DDC Project number and Contract Number
2. Date
3. Destination (To:)
4. Source (From:)
5. Names of Contractor, Subcontractor, manufacturer, and supplier
6. Category and type of Submittal
7. Submittal purpose and description
8. Specification Section number and title
9. Drawing number and detail references, as appropriate
10. Transmittal number, numbered consecutively
11. Submittal and transmittal distribution record
12. Remarks
13. Signature of transmitter

G. Shop Drawings:

1. Procedures for Preparing, Forwarding, Checking, and Returning all Shop Drawings must be, generally, as follows:

   a. The Contractor must make available to its Subcontractors the necessary Contract Documents and must instruct such Subcontractor to determine dimensions and conditions in the field, particularly in reference to coordination between the trade Subcontractors. The Contractor must direct its Subcontractors to prepare Shop Drawings for submission to the Design Consultant in accordance with the requirements of these General Conditions. The Contractor

must also direct its Subcontractors to "Ring Up" corrections made on all re-submissions for approval, so as to be readily seen, and that the appropriate symbol per item 2 below (e.g., "GC") be used to identify the source of the correction or information that has been added.

The Contractor must:

1. Review and be responsible for information shown on its Subcontractor's Shop and Installation Drawings and manufacturers' data, and conformity to Contract Documents.
2. "Ring Up" corrections made on all submissions for approval, so as to be readily seen, and that the symbol "GC", "PL", "HVAC", or "EL" be used to indicate that the correction and/or information added was made by the Contractor and/or its Subcontractor(s).
3. Clearly designate which entity is to perform the Work when the term, "work by others" or other similar phrases are indicated on the Contract Drawings before submission to the Design Consultant.
4. Stamp submissions "Recommended for Acceptance", date and forward to the Design Consultant.

2. The Contractor must promptly prepare and submit project specific layout detail and Shop Drawings of such parts of the Work as are indicated in the Specifications, or as required. These Shop Drawings must be made in accordance with the Contract Drawings, Specifications and Supplementary Drawings, if any. The Shop Drawings must be accurate and distinct and give all the dimensions required for the fabrication, erection, and installation of the Work.

3. Size of Drawings: The Shop Drawings, unless otherwise directed, must be on sheets of the same size as the Contract Drawings, drawn accurately and of sufficient scale to be legible, with a one half (1/2) inch marginal space on each side and a two (2) inch marginal space for binding on the left side.

4. Scope of Drawings: Shop Drawings must be numbered consecutively and must accurately and distinctly represent all aspects of the Work, including without limitation the following:

   a. All working and erection dimensions
   b. Arrangements and sectional views
   c. Necessary details, including performance characteristics and complete information for making necessary connections with other Work
   d. Kinds of materials including thickness and finishes
   e. Identification of products
   f. Fabrication and installation drawings
   g. Roughing-in and setting diagrams
   h. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring
   i. Shop work manufacturing instructions
   j. Templates and patterns
   k. Schedules
   l. Design calculations
   m. Compliance with specified standards
   n. Notation of coordination requirements
   o. Notation of dimensions established by field measurement
   p. Relationship to adjoining construction clearly indicated
   q. Seal and signature of professional engineer if specified
   r. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring
   s. All other information necessary for the Work and/or required by the Commissioner

5. Titles and Reference: Shop Drawings must be dated and contain:
   a. Name of the Project, DDC Project Number, and Contract Number
   b. The descriptive names of equipment or materials covered by the Contract Drawings and the classified item number or numbers.
   c. The locations or points and sequence at which materials, or equipment, are to be installed in the Work

d. Cross references to the section number, detail number, and paragraph number of the Contract Specifications
e. Cross references to the sheet number, detail number, etc., of the Contract Drawings

6. Field Measurements: In addition to the above requirements, the Shop Drawings must be signed by the Contractor and, if applicable, the Subcontractor responsible for preparation of the Shop Drawings. Each Shop Drawing must be stamped with the following wording:

   FIELD MEASUREMENTS: The Contractor certifies that it has verified and supplemented the Contract Drawings by taking all required field measurements, which said measurements correctly reflect all field conditions and that this Shop Drawing incorporates said measurements.

7. Contractor's Statement with Submittal: Any Submittal by the Contractor for acceptance, including without limitation, all dimensional drawings of equipment, blueprints, catalogues, models, samples and other data relative to the equipment, the materials, the Work or any part thereof, must be accompanied by a statement that the Submittal has been examined by the Contractor and that everything shown in the Submittal is in accordance with the requirements of the Contract Drawings and Specifications. If there is any discrepancy between what is shown in the Submittal and the requirements of the Contract Drawings and Specifications, the Contractor must, in its statement, list and clearly describe each discrepancy.

8. Acceptance will be given based upon the Contractor's representation that what is shown in the Submittal is in accordance with the requirements of the Contract Drawings and Specifications. If the Contractor's statement indicates any discrepancy between what is shown in the Submittal and the requirements of the Contract Drawings and Specifications, such change is subject to review and prior written acceptance by the Design Consultant. In addition, such change may require a change order in accordance with Article 25 of the Contract. In the event any such change is approved, any additional expense or increased cost in connection with the change is the sole responsibility of the Contractor.

9. Submission of Shop Drawings:

   a. Initial Submission: The Contractor must submit seven (7) copies, or as requested by the Resident Engineer, of each Shop Drawing to the Design Consultant for his/her review and acceptance. If PDF drawings are requested by the Resident Engineer, they must be provided in an original "printed from digital" format, and not scanned. The Design Consultant will transmit Shop Drawings to appropriate sub-consultants for review and acceptance, including Commissioning Authority/Agent as applicable. A satisfactory Shop Drawing will be digitally stamped "No Exceptions Taken", be dated and transmitted by the Design Consultant as follows:

      1) Addressed to the Contractor, with a cc to the following:

         a) Design Consultant's sub consultant(s) as appropriate
         b) DDC

      2) Should the Shop Drawing(s) be "Rejected" or noted "Revise and Resubmit" by the Design Consultant, the Design Consultant will transmit the Shop Drawings to the Contractor with the necessary corrections and changes to be made as indicated thereon.

   b. Revisions: The Contractor must make such corrections and changes and again transmit each shop drawing to the Design Consultant. The Contractor must revise and resubmit the Shop Drawing as required by the Design Consultant until the Shop Drawings are stamped "No

Exceptions Taken". However, Shop Drawings which have been stamped "Make Corrections Noted" will be considered an "Acceptable" Shop Drawing and NEED NOT be resubmitted.

c. Commencement of Work: No Work or fabrication called for by the Shop Drawings must be done until the acceptance of the said drawings by the Design Consultant is given. In addition to the foregoing Shop Drawing transmissions, a copy of any Shop Drawing prepared by any of the Contractor's Subcontractors which Shop Drawing indicated Work related to, adjacent to, impinging upon, or affecting Work to be done by other Subcontractors must be transmitted to the Subcontractors so affected. [These accepted Shop Drawings must be distributed to the affected Subcontractors when required with a copy of the transmittal to the Resident Engineer.]

d. Variations: If the Shop Drawings show variations from the Contract requirements because of standard shop practice or other reasons, the Contractor must make specific mention of such variations in its letter of Submittal. Acceptance of the Shop Drawings must constitute acceptance of the subject matter thereof only and not of any structural apparatus shown or indicated.

H. Product Data:

1. General: Except as otherwise prescribed herein, the submission, review, and acceptance of Product Data and Catalogue cuts must conform to the procedures specified in subsection 1.6 G, Shop Drawings.

2. If information must be specially prepared for the Submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.

3. Mark each copy of the Submittal to show which products and options are applicable.

4. Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Standard color charts.
e. Manufacturer's catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Printed performance curves.
h. Operational range diagrams.
i. Mill reports.
j. Standard product operation and maintenance manuals.
k. Compliance with specified referenced standards.
l. Testing by recognized testing agency.
m. Application of testing agency labels and seals.
n. Notation of coordination requirements.

5. Submit Product Data before or concurrent with Samples.

6. Submission of Product Data:

a. Initial Submission: The Contractor must submit seven (7) sets of Product Data to the Design Consultant for his/her review and acceptance. The Design Consultant will transmit Product Data to appropriate sub-consultants for review and acceptance, including Commissioning Authority/Agent as applicable. A satisfactory catalogue cut will be digitally stamped "No Exception Taken", be dated and transmitted as follows:

1) Addressed to the Contractor, with a cc to the following:

a) Design Consultant's sub consultant(s) as appropriate
b) DDC

2) Should the Product Data be “Rejected” or noted “Revise and Resubmit” by the Design Consultant, the Design Consultant will return one (1) set of such Product Data to the Contractor with the necessary corrections and changes to be made indicated and one (1) set to DDC.

7. Revisions: The Contractor must make such corrections and changes and again submit seven (7) copies of each Product Data for the review of the Design Consultant. The Contractor must revise and resubmit the Product Data as required by the Design Consultant until the submission is stamped “No Exceptions Taken” by the Design Consultant. However, Product Data which has been stamped "Make Corrections Noted" must be considered an "Accepted" Product Data and NEED NOT be resubmitted.

I. Samples of Materials:

1. For samples of materials involving electrical Work of any nature, refer to Section 01 35 06 GENERAL ELECTRICAL REQUIREMENTS.

2. Samples must be in triplicate or as directed by the Resident Engineer, and of sufficient size to show the quality, type, range of color, finish and texture of the material.

3. Each of the samples must be labeled as follows:

   a. Name of the Project, DDC Project Number and Contract Number
   b. Name and quality of the material
   c. Date
   d. Name of Contractor, subcontractor, manufacturer and supplier
   e. Related Specification or Contract Drawing reference to the samples submitted

4. A letter of transmittal, in triplicate, from the Contractor requesting acceptance must accompany all such samples.

5. Transportation charges to the Design Consultant’s office must be prepaid on all samples forwarded.

6. Samples for testing purposes must be as required in the Specifications.

7. Samples on Display: When samples are specified to be equal to approved product, they must be carefully examined by the Contractor and by those whom the Contractor expects to employ for the furnishing of such materials.

8. Timely Submissions Log/Schedule: Samples must be submitted in accordance with approved Shop Drawing log so as to permit proper consideration without delaying any operation under the Project. Materials should not be ordered until acceptance is received, in writing, from the Design Consultant. All materials must be furnished equal in every respect to the accepted samples.

9. The acceptance of any samples will be given as promptly as possible, and will be only for the characteristic color, texture, strength, or other feature of the material named in such acceptance, and no other. When this acceptance is issued by the Design Consultant, it is done with the distinct understanding that the materials to be furnished will fully and completely comply with the Specifications, the determination of which may be made at some later date by a laboratory test or by other procedure. Use of materials will be permitted only so long as the quality remains equal to the approved samples and complies in every respect with the Specifications, and the colors and textures of the samples on file in the office of the Design Consultant, for the Project.

10. Acceptability of test Data: The Commissioner will be the final judge as to acceptability of laboratory test data and performance in service of materials submitted.

11. Valuable Samples: Valuable samples, such as hardware, plumbing and electrical fixtures, etc., not destroyed by inspection or test, will be returned to the Contractor and may be incorporated into the

Work after all questions of acceptability have been settled, providing suitable permanent records are made as to the location of the samples, their properties, etc.

J. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

K. Supplementary Qualification Data: Prepare written information that demonstrates capabilities and experience of entity. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

L. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

M. Certificates:

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.

2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS formats. Include names of firms and personnel certified.

N. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements

in the Contract Documents.

4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
   a. Name of evaluation organization.
   b. Date of evaluation.
   c. Time period when report is in effect.
   d. Product and manufacturers' names.
   e. Description of product.
   f. Test procedures and results.
   g. Limitations of use.

O. Equivalent Quality: Any material, article and/or equipment which is designated in the Drawings and/or Specifications by a number in the catalogue of any manufacturer or by a manufacturer's grade or trade name is designated for the purpose of describing the material, article and/or equipment and fixing the standard of performance and/or function, as well as the quality and/or finish. Any material, article and/or equipment which is other than what is specified in the Drawings and/or Specifications will only be accepted if the Commissioner makes a written determination that such material, article and/or equipment is equivalent to that which is specified in the Drawings and/or Specifications.

P. The submission of any material, article and/or equipment as the equal of any material, article and/or equipment set forth in the Drawings and/or Specifications as a standard must be accompanied by any and all information essential for determining whether such proposed material, article and/or equipment is equivalent to that which is specified. Such information must include, without limitation, illustrations, drawings, descriptions, catalogues, records of tests, samples, as well as information regarding the finish, durability and satisfactory use of such proposed material, article and/or equipment under similar operating conditions.

Q. Engineering Services Submittals:

1. Performance and Design Criteria: Refer to Section 01 40 00 QUALITY REQUIREMENTS, Article 1.5.
2. Engineering Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file and three paper copies of certificate, signed and sealed by the responsible professional engineer, for each product and system specifically required of the Contractor to be designed or certified by a professional engineer.
   a. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
3. BIM Incorporation: Incorporate engineering services drawing and data files into BIM established for Project.
   a. Prepare engineering services documents in the required formats, including BIM incorporation.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.7

1.7 LEED SUBMITTALS:

A. Comply with Submittal requirements specified in the following sections:

1. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL;
2. Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS
3. Section 01 81 19 INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS;
4. Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS; and/or,
5. Section 01 91 15 BUILDING ENCLOSURE COMMISSIONING REQUIREMENTS.

B. LEED Building Submittal information must be assembled into one package per each applicable Specification Section, separate from all other non-LEED Submittals. Each Submittal package must have a separate transmittal and identification as described in Subsection 1.5 herein.

C. Number of Copies: Submit four (4) copies of LEED Submittals, in accordance with procedure described in Article 1.5 herein, unless otherwise indicated.

D. Material Safety Data Sheets (MSDSs) for LEED Certification: Submit information necessary to show compliance with LEED certification requirements, which will be the limit of the Design Consultant's review for LEED compliance.

1. Designated LEED Submittals that include non-LEED MSDS data will not be reviewed. The entire Submittal will be returned for re-submission.

E. Product Cut Sheets and/or Shop Drawings for LEED Certification: Provide product cut sheets and/or shop drawings with the Contractor's or sub-contractor's stamp, confirming that the submitted products are the products installed in the Project. For detailed requirements refer to Subsection 1.6 of Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS.

1. Provide the quantity, length, area, volume, weight, and/or cost of each product submitted as required to satisfy LEED documentation requirements, if applicable.

1.8 ULTRA LOW SULFUR DIESEL FUEL AND BEST AVAILABLE TECHNOLOGY REPORTING:

A. In accordance with Section 01 10 00 SUMMARY, Subsection 1.10 E**,** the Contractor must submit reports to the Commissioner regarding the use of Ultra Low Sulfur Diesel Fuel and Best Available Technology (BAT) in Non road Vehicles. Submission of such reports must be in accordance with the schedule, format, directions and procedures established by the Commissioner.

1.9 CONSTRUCTION PHOTOGRAPHS AND VIDEO RECORDINGS:

A. Submit construction progress photographs and Video recordings in accordance with requirements of Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION.

1.10 AS-BUILT DOCUMENTS:

A. Submit all as-built documents in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 33 00

SECTION 01 35 03
GENERAL MECHANICAL REQUIREMENTS

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 35 03

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. The General Mechanical Requirements contained herein must be followed by the Contractor, as well as its Subcontractor for HVAC work. This Section sets forth the General Requirements applicable to mechanical work for the Project. Such requirements are intended to be read in conjunction with the Specifications and Contract Drawings for the Project. In the event of any conflict between the requirements set forth in this Section and the requirements of the Specifications and/or the Contract Drawings, whichever requirement is the most expensive must take precedence, in accordance with Article 1.2 of the Standard Construction Contract.

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 33 00 SUBMITTAL PROCEDURES
C. Section 01 35 06 GENERAL ELECTRICAL REQUIREMENTS
D. Section 01 42 00 REFERENCES
E. Section 01 77 00 CLOSEOUT PROCEDURES
F. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

A. CONCEALED PIPING AND DUCTS: piping and ducts hidden from sight in masonry or other construction, in floor fill, trenches, partitions, hung ceilings, furred spaces, pipe shafts and in service tunnels not used for passage. Where piping and ducts run in areas that have hung ceilings, such piping and ducts must be installed in the hung ceilings. For Work on existing piping, any insulation on such existing piping is to be tested for asbestos and abated if found to be positive by a certified asbestos contractor. Such testing and abatement must occur prior to the performance of any Work on these pipes.

1.5 SUBMITTALS:

A. INTENT OF MECHANICAL CONTRACT DRAWINGS – Mechanical Contract Drawings are, in part, diagrammatic and show the general arrangement of the equipment, ducts, and piping included in the Contract and the approximate size and location of the equipment.

B. The Contractor must follow these Contract Drawings in laying out the Work and verify the spaces in which it will be installed. The Contractor must submit, as directed, Mechanical Shop Drawings, roughing drawings,

manufacturer's Shop Drawings, field drawings, cuts, bulletins, etc., of all materials, equipment and methods of installation shown or specified in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

1. Submit sheet metal shop standards. Submit manufacturer's product data including gauges, materials, types of joints, scaling materials and installations for metal ductwork materials and products.
2. Submit scaled layout drawing (3/8"=1') of metal ductwork and fittings including, but not limited to, duct sizes, locations, elevations, slopes of horizontal runs, wall and floor penetrations and connections. Show modifications of indicated requirements made to conform to local shop practice and how those modifications ensure that free area, materials and rigidity are not reduced. Layouts should include all the room plans, mechanical equipment rooms and penthouses. Method of attachment of duct hangers to building construction all with the support details. Coordinate Shop Drawings with related trades prior to submission.
3. Indicate duct fittings, particulars such as gauges, sizes, welds and configuration prior to start of work for low-pressure systems.
4. Submit maintenance data and parts lists for metal ductwork materials and products. Include this data, product data and shop drawings in maintenance manual.

1.6 ACCESS:

A. All Work must be installed by the Contractor to readily provide access for inspection, operation, maintenance and repair. Minor deviations from the arrangement indicated on the Contract Drawings may be made to accomplish this, but they must not be made without prior written approval by the Commissioner.

1.7 CHANGES IN PIPING, DUCTS, AND EQUIPMENT:

A. Wherever field conditions are such that for proper execution of the Work, reasonable changes in location of piping, ducts, and equipment are necessary and required, the Contractor must make such changes as directed and approved, without extra cost to the City.

1.8 CLEANING OF PIPING, DUCTS, AND EQUIPMENT:

A. Piping, ducts, and equipment must be thoroughly cleaned by the Contractor of all dirt, cuttings, and other foreign substances. Should any pipe, duct, or other part of the several systems be obstructed by any foreign matter, the Contractor will be required to pay for disconnecting, cleaning, and reconnecting wherever necessary for the purpose of locating and removing obstructions. The Contractor must pay for repairs to other work damaged in the course of removing obstructions. For work on existing piping, ducts, and equipment, the Contractor must pay special attention during this task so as not to disturb the insulation on such piping, ducts, or equipment.

1.9 STANDARDIZATION OF SIMILAR EQUIPMENT:

A. Unless otherwise particularly specified, all equipment of the same kind, type, or classification, used for identical purposes, must be the product of one (1) manufacturer.

1.10 SUPPORTING STRUCTURES DESIGNED BY THE CONTRACTOR:

A. Unless otherwise specified, supporting structures for equipment to be furnished by the Contractor must be designed by a Professional Engineer licensed in the State of New York retained by the Contractor. Supporting structures must be built by the Contractor of sufficient strength to safely withstand all stresses to which they

may be subjected, within permissible deflections, and must meet the following standards:

1. Structural Steel - ASTM Standard Specifications, AISC and New York City Construction Codes.
2. Concrete for supports for equipment must conform to the Specifications for concrete herein, but in no case must be less than the requirements of the New York City Construction Codes for average concrete.
3. Steel reinforcement for concrete must be of intermediate grade and must meet the requirements of the Standard Specifications for Billet Steel-Concrete Reinforcement Bars, ASTM.
4. Drawings and calculations must be submitted for review and acceptance in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

1.11 ELIMINATION OF NOISE:

A. All systems and/or equipment provided under the Contract must operate without objectionable noise or vibration.

B. Should operation of any one or more of the several systems produce noise or vibration which is, in the opinion of the Commissioner, objectionable, the Contractor must, at its own expense, make changes in piping, equipment, etc., and do all work necessary to eliminate objectionable noise or vibration.

C. Should noise or vibration that is found objectionable by the Commissioner be transmitted by any pipe or portions of the structure from systems and/or equipment installed under the Contract, the Contractor must, at its own expense, install such insulators and make such changes in or additions to the installations as may be necessary to prevent transmission of this noise or vibration.

1.12 PRELIMINARY FIELD TEST:

A. As soon as conditions permit, the Contractor must furnish all necessary labor and materials for, and must make preliminary field tests of the equipment to ascertain compliance with the requirements of the Contract. If the preliminary field tests disclose equipment that does not comply with the Contract, the Contractor must, prior to the acceptance test, make all changes, adjustments, and replacements as required.

1.13 INSTRUCTIONS ON OPERATION:

A. At the time the equipment is placed in permanent operation by the City, the Contractor must make all adjustments and tests required by the Commissioner to prove that such equipment is in proper and satisfactory operating condition. The Contractor must instruct the City's operating personnel on the proper maintenance and operation of the equipment for the period of time called for in the Specifications.

1.14 CERTIFICATES:

A. On completion of the Work, the Contractor must obtain certificates of inspection, approval, and acceptance, and be in compliance with all laws from all agencies and/or entities having jurisdiction over the Work and must deliver these certificates to the Commissioner in accordance with Section 01 77 00 CLOSEOUT PROCEDURES. The Work will not be deemed substantially complete until the certificates have been delivered.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 35 03

SECTION 01 35 06
GENERAL ELECTRICAL REQUIREMENTS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section sets forth the General Requirements applicable to electrical work for the Project. Such requirements are intended to be read in conjunction with the Specifications and Contract Drawings for the Project. In the event of any conflict between the requirements set forth in this Section and the requirements of the Project Specifications and/or the Contract Drawings, whichever requirement is the most expensive must take precedence, in accordance with Article 1.2 of the Standard Construction Contract.

B. This Section includes the following:
   1. Related Sections
   2. Definitions
   3. Procedure for Electrical Approval
   4. Submittals
   5. Electrical Installation Procedures
   6. Electrical Conduit System Including Boxes (Pull, Junction and Outlet)
   7. Electrical Wiring Devices
   8. Electrical Conductors and Terminations
   9. Circuit Protective Devices
   10. Distribution Centers
   11. Motors
   12. Motor Control Equipment

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 33 00 SUBMITTAL PROCEDURES
C. Section 01 35 03 GENERAL MECHANICAL REQUIREMENTS
D. Section 01 42 00 REFERENCES
E. Section 01 77 00 CLOSEOUT PROCEDURES
F. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

A. WIRING: contains wire and raceway (rigid steel, heavy wall conduit unless specifically indicated otherwise).

B. POWER WIRING: wiring from a panel board or other specified source to a starter (if required), then to a disconnect (if required), then to the final point of usage such as a motor, unit, or device.

C. CONTROL and/or INTERLOCK WIRING: wiring that signals the device to operate or shut down in response to a signal from a remote control device such as a temperature, smoke, pressure, float, etc. device (starters and disconnect switches are not included in this definition) regardless of the voltage required for the controlling device.

D. RIGID STEEL CONDUIT: rigid steel heavy wall conduit that is hot-dip galvanized inside and outside. The conduit must meet the requirements of the latest edition, as amended, of the "Standard for Rigid Steel Conduit" of the Underwriters' Laboratories, Inc. Unless otherwise specified in the Specifications or indicated on the Contract Drawings, rigid steel conduit must be used for all exposed work, all underground conduits in contact with earth, and fire alarms systems, as required by the New York City Construction Codes.

E. ELECTRICAL METALLIC TUBING (EMT): industry standard thin wall conduit of galvanized steel. All elbows, bends, couplings and similar fittings which are installed as a part of the conduit system must be compatible for use with electric metallic tubing. Couplings and terminating fittings must be of the pressure type as approved by the Commissioner. Set screw fittings will not be acceptable. EMT must meet the requirements of the latest edition, as amended, of the "Standard for Electrical Metallic Tubing" of the Underwriters Laboratories Inc. <u>EMT may only be used where specifically indicated. In no case will EMT be permitted in spaces other than hung ceilings and dry wall partitions.</u>

F. FLEXIBLE METALLIC CONDUIT (FMC): a conduit made through the coiling of a self-interlocking ribbed strip of aluminum or steel, forming a hollow tube through which wires can be pulled. For final connections to motors and motorized equipment, not more than a 4' - 0" length of flexible conduit may be used. For watertight installations, this conduit must be of a watertight type, attached with watertight glands or fittings for final connections from outlet box to recessed lighting fixtures and in locations only where specifically permitted by the Specifications or Contract Drawings.

1.5 PROCEDURE FOR ELECTRICAL APPROVAL:

This Section sets forth General Electrical information, as well as required approvals for all electrical work required for the Project, including ancillary electrical work which may be included in the work of other trade Subcontractors.

A. ELECTRIC SERVICE: The electric service supply is subject to commercial and operating variation of the utility company. Proper provision must be made to have all apparatus operate normally under these conditions.

B. ACCEPTANCE: Acceptance and approval of the Work will be contingent upon the inspection and test of the installation by the City regulatory agency.

C. TESTS: The Contractor must notify the Commissioner when the Contractor has completed the work and is ready to have it inspected and tested. Upon completion of the Work, tests must be made as required by the Commissioner of all electrical materials, electrical and associated mechanical equipment, and of appliances installed hereunder. The Contractor must furnish all labor and material for such tests. Should the tests show that any of the material, appliances or workmanship is not first class or not in compliance with the Contract, on written notice the Contractor must remove and promptly replace the materials to be in conformity with the Contract.

D. CERTIFICATE OF THE BUREAU OF ELECTRICAL CONTROL, OF THE DEPARTMENT OF BUILDINGS (B.E.C.): Prior to requesting a substantial completion inspection, the Contractor must file a Certificate of Inspection issued by B.E.C. On completion of the Work, the Contractor must obtain certificates of inspection, approval, acceptance and compliance from all agencies and/or entities having jurisdiction over the work and must deliver these certificates to the Commissioner in accordance with Section 01 77 00 CLOSEOUT PROCEDURES.

E. RESPONSIBILITY FOR CARE AND PROTECTION OF EQUIPMENT:

1. The Contractor furnishing any equipment must be responsible for the equipment until it has been inspected, tested and accepted, in accordance with the requirements of the Contract.

2. After delivery, before and after installation, the Contractor must protect all equipment against theft, injury or damage from all causes. The Contractor must carefully store all equipment received for work which is not immediately installed. If any equipment has been subject to possible injury by water, it must be thoroughly dried out and put through a special dielectric test as directed by the Commissioner, at the expense of the Contractor or replaced by the Contractor without additional cost to the city.

F. UNIFORMITY OF EQUIPMENT: Any two (2) or more pieces of equipment, apparatus or materials of the same kind, type, or classification, which are intended to be used for identical types of service, must be made by the same manufacturer.

1.6 SUBMITTALS:

A. CONTRACTOR'S ELECTRICAL DRAWINGS AND SAMPLES FOR APPROVAL:

1. The Contractor must submit to the Commissioner for approval, in accordance with Section 01 33 00 SUBMITTAL PROCEDURES, complete dimensional drawings of all equipment, wiring diagrams, motor test data, details of control, installation layouts showing all details and locations and including all schedules, and descriptions and supplementary data to comprise complete working drawings and instructions for the performance of the Work. A description of the operation of the equipment and controls must be included. A letter, in triplicate, must accompany each submittal.

2. The Contractor must submit in accordance with Section 01 33 00 SUBMITTAL PROCEDURES, duplicate samples of such materials and appliances as may be requested by the Commissioner for approval. These samples must be properly tagged for identification and submitted for examination and test. After the samples are approved, one (1) sample will be returned to the Contractor and the other sample will be filed in the office of the Commissioner's representative for inspection use. After the Contract is completed, the second set of samples will be returned to the Contractor.

B. TIMELINESS: All material must be submitted in accordance with the Submittal Schedule in sufficient time for the progress of construction. Failure to promptly submit acceptable samples and dimensional drawings of equipment will not be accepted as grounds for an extension of time. The Commissioner may decline to consider submittals unless all related items are submitted at the same time.

C. CONTRACTOR'S STATEMENT WITH SUBMITTALS: Contractor must submit a statement in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.

D. BULLETINS AND INSTRUCTIONS: The Contractor must furnish and deliver to the Commissioner in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS and Section 01 77 00 CLOSEOUT PROCEDURES, after acceptance of the work, four (4) complete sets of instructions, technical bulletins and any other printed matter (diagrams, prints, or drawings) required to provide complete information for the proper operation, maintenance and repair of the equipment and the ordering of spare parts.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

3.1 ELECTRICAL INSTALLATION PROCEDURES:

This Sub-Section sets forth the General Installation Procedure that must apply to all electrical work and electrical equipment appearing in the Contract.

(Refer to Sub-Section 1.4 DEFINITIONS for terms used in this section)

A. INTENT OF CONTRACT DOCUMENTS: The Drawings and Specifications are to be interpreted as a means of conveying the scope and intent of the work without giving every minor electrical detail. It is intended, nevertheless, that the Contractor must provide whatever labor and materials are found necessary, within the scope of the Contract, for the successful operation of the installation. Specific details of individual installations are to be finally decided upon when the Contractor submits Working or Shop Drawings for approval to DDC. Whenever there are two (2) or more methods to complete Project work within the Contract scope, the Commissioner reserves the right to choose that method which, in the Commissioner's opinion, will afford the most satisfactory performance, lasting qualities, and access for repairs, even if this selection is the costliest.

B. SCHEMATIC PLANS – APPROXIMATE LOCATIONS: Conduits and wiring are shown on the plans for diagrammatic purposes only. Therefore, conduit layouts may not necessarily give the actual physical route of the conduits. The Contractor who installs a conduit system will also be required, as part of the work, to furnish and install all hangers and pull-boxes, including any special pull-boxes found necessary to overcome interferences, and to facilitate the pulling of electrical cables. Similarly, the locations of equipment, appliances, outlets and other items shown on Contract Drawings are only approximate and are to be definitively established when equipment Shop Drawings are submitted and approved by DDC during construction.

C. SLEEVES: required for conduits passing through walls or floors; must be furnished and set by the Contractor installing the conduits. Sleeves in waterproofed floors must be provided with flashing extending twelve (12) inches in all directions from sleeve and secured to waterproofing. Flashing must be turned down into space between pipe and sleeve and caulked watertight. Flashing must be twenty (20) ounces cold rolled copper. Sleeves must be supplied with welded flanges similar to those supplied by the Subcontractor for Plumbing Work and must extend one (1) inch above finished floor.

D. COORDINATION: The Contractor must keep in close touch with the construction progress and promptly obtain the necessary information for the accurate placement of its work well before Project construction operations obstruct its work. The Contractor is to consult all other Contract Drawings, as well as approved equipment Shop Drawings on file in the Resident Engineer's Field Office. This will aid in avoiding interferences, omissions, and errors in the electrical installation.

E. RESTORATION: If drilling or cutting is done on finished surfaces of equipment or the structure, any marring of the surface must be repaired or replaced by the Contractor. The Contractor must be held responsible for corrective restoration due to its cutting or drilling, and for any damage to the Project or its contents caused by the Contractor or the Contractor's workers. If any piercing of waterproofing occurs because of the installation of the work, the Contractor must restore the waterproofing, at its own expense, to the satisfaction of the Commissioner.

F. ELECTRICAL WORK AT SITE: The Contractor furnishing equipment consisting of a number of related electrical devices or appliances, mounted in a single enclosure, or on a common base, must furnish this

unit, ready for connection and operation, complete with internal wiring, connections, terminal boxes with copper connectors and/or lugs and ample electrical leads. The cost of any wiring, re-wiring, or other work required to be done on this unit in the field, must be borne by the Contractor, without additional cost to the city.

G. COOPERATION AMONG SUBCONTRACTORS: Whenever an electrically operated unit or system involves the combined work of several Subcontractors for its installation and successful operation, the Contractor must require each Subcontractor to exercise the utmost diligence in cooperating with others to produce a complete, harmonious installation.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.2

3.2 ELECTRICAL CONDUIT SYSTEM INCLUDING BOXES (PULL, JUNCTION AND OUTLET):

This Sub-Section sets forth the requirements applying to the installation of electrical conduits, boxes or fittings. Rigid steel conduit must be used throughout, unless otherwise directed by the Commissioner. Where the word 'conduit' is used without a modifier such as, rigid steel, EMT, etc., must be interpreted to mean rigid steel, heavy wall, threaded conduit.

(Refer to Sub-Section 1.4 DEFINITIONS for terms used in this section)

A. INSTALLATIONS AND APPLICATIONS:

1. Unless otherwise specified or indicated on the Contract Drawings, conduit runs must be installed concealed in finished spaces.

2. CONDUIT SIZES: The sizes of conduits must be as indicated on the Contract Drawings. Wherever conduit sizes are not indicated, the conduit must meet the requirements of the New York City Electrical Code to accommodate the conductors to be installed therein.

3. Conduits must be reamed smooth after cutting. No running threads will be permitted. Universal type couplings must be used where required. Conduit joints must be screwed up to butt. Empty conduits after installation must have all open ends temporarily plugged to prevent the entrance of water or other foreign matter.

4. Conduits installed in concrete or masonry must be securely held in place during pouring and construction operations. A group of conduits terminating together must be held in place by a template.

5. UNDERGROUND STEEL CONDUITS: Unless otherwise specified, all underground steel conduits in contact with earth must be encased by the Contractor who installs them, in a covering of not less than two (2) inches of an approved concrete mixture. Concrete mix must be one (1) part cement to four and one-half (4 ½) parts of fine and coarse aggregate.

6. EXCAVATION RESTORATION PERMITS: When installing underground conduits, duct banks or manholes, the Contractor must perform the work of cutting pavement, excavation shoring, keeping trenches or holes pumped dry, backfilling, restoration of surfaces to original condition and removal of excess earth and rubbish from premises. During the work, the Contractor must provide adequate crossovers, protective barriers, lamps, flags, etc., to safeguard traffic and the public. When the work is in a public highway or street, the Contractor must secure and pay for all necessary permits, inspection fees, and the cost of repaving.

7. EXPOSED CONDUIT SUPPORTS: Exposed conduits must be supported by Galvanized hangers with necessary inserts, beam clamps of approved design, or attached to walls or ceilings by expansion bolts. Exposed conduits must be supported or fastened at intervals not more than five (5) feet.

8. Exposed conduits must be installed parallel or at right angles to ceilings, walls and partitions. Where direction changes of exposed conduit cannot be made with neat bends, as may be required around beams or columns, conduit-type fittings must be used.

9. Conduit must be installed with an expansion joint approved by the Commissioner in the following conditions:

   a. Wherever the conduit crosses a building expansion joint, the Contractor will be held responsible for determining where the building expansion joints are located.

   b. Every 200 feet, when in straight runs of 200 feet or longer.

10. Conduits may only enter and leave a floating slab in a vertical direction, and only in an approved manner. Horizontal entries into floating slabs are not permitted.

11. Conduits installed in pipe shafts must be properly supported to carry the total weight of the raceway system complete with cable. In addition, at least one (1) horizontal brace per 10 ft. section must be provided to assure stability of the raceway system.

12. BUSHINGS AND LOCKNUTS: Approved bushings and locknuts must be used wherever conduits enter outlet boxes, switch boxes, pull boxes, panel board cabinets, etc.

13. CONDUIT BENDS: must be made without kinking conduit or appreciably reducing the internal diameter. All bends in conduits of two (2) inch in diameter or larger must be made with a hydraulic or power pipe bender. The radius of the inner edge of any bend must not be less than six (6) times the internal diameter of the conduit where rubber covered conductors are to be installed, and not less than ten (10) times the internal diameter of the conduit where lead covered conductors are to be used. Long gradual sweeps will be required, rather than sharp bends, when changes of direction are necessary.

14. EMPTY CONDUITS

   a. TESTS: All conduits and ducts required to be installed and left empty must be tested for clear bore and correct installation by the Contractor using a ball mandrel and a brush and snake before the installation will be accepted. The ball must be turned to approximately 85% of the internal diameter of the raceway to be tested. Two (2) short wire brushes must be included in the mandrel assembly. Snaking of conduits, ducts, etc., must be performed by the Contractor in the presence of the Resident Engineer. Any conduits or ducts which reject the mandrel must be cleared at once with the Contractor bearing all costs, such as chopping concrete, to replace the defective conduit and restore the surface to its original condition.

   b. TAGS: Numbers or letters must be assigned to the various conduit runs, and as they test clear they must be identified by a fiber tag not less than 1-¼ inch width, attached by means of a nylon cord. All conduit terminations in panel, splice or pull boxes, as well as those out of the floor or ceiling, must be tagged.

   c. TEST RECORDS: As the conduit runs clear, a record must be kept under the heading of "Empty Conduit Tested, Left Clear, Tagged and Capped" showing conduit designation, diameter, location, date tested and by whom. When complete, this record must be signed by the Resident Engineer and submitted in triplicate for approval. This record must be entered on the Contract Record Drawings under Section 01 78 39 CONTRACT RECORD DOCUMENTS.

   d. CAPPING: After test, all empty conduit and duct openings, must be capped or plugged by the Contractor as directed.

   e. DRAG LINES: A drag line must be left in all empty conduit.

B. BOXES:

1. The Contractor must furnish and erect all pull boxes indicated on the plans or where required. Sides, top and bottom of pull boxes must be Galvanized coated and must be built of No. 12 USSG steel reinforced at corners by substantial angle irons and riveted or welded to plates. Bottom or side of pull boxes must be removable and held in place by corrosion resistant machine screws. Pull boxes in damp locations must have threaded hubs and gaskets and be NEMA 4X. All pull boxes must be suspended from ceiling or walls in the most substantial manner.

2. In centering outlets, the Contractor is cautioned to allow for overhead pipes, ducts and other obstructions, and for variations in arrangement and thickness of fireproofing, soundproofing and plastering. Precaution should be exercised regarding the location of window and door trims, paneling, etc. Mistakes resulting from failure to exercise precaution must be corrected by the Contractor at no additional cost to the City. Outlets in hung ceilings must be supported from the black iron or structure.

3. The exact location of all outlets in finished rooms must be as directed by the Commissioner. When the interior finish has been applied, the Contractor must make any necessary adjustment of its work to properly center the outlets. All outlet boxes for local switches near doors must be located at the strike side of doors as finally hung, whether so indicated on the drawings or not.

4. Exposed wall outlet boxes must be securely anchored, erected neatly and tight against the walls.

5. All wall outlets of each type must be set accurately at the same level on each floor, except where otherwise specified or directed by the Commissioner. Where special conditions occur, outlets must be located as directed.

6. MOUNTING HEIGHTS: The following heights are standard heights and are subject to correction due to coordination with Contract Drawings. All such changes must be approved by the Resident Engineer. Heights given are from finished floor to center line of outlet or device on wall or partition, unless otherwise indicated.

a.	General Convenience Outlets (mount vertical)	1'-6"
b.	Clock Outlets	8'-6"or 1'-6" below ceiling
c.	Wall Lighting Switches	4'-0"
d.	Motor Controllers	5'-0"
e.	Motor Push-button	4'-2"
f.	Telephone Outlets	As Directed by the Commissioner
g.	Fire Alarm Bells	8'-6"or 1'-6" below ceiling
h.	Fire Alarm Stations	4'-0"
i.	Intercom Outlet	1'-6"
j.	Cooking and Refrigerator Unit	As Directed

7. Outlet boxes must be of a design and construction approved by the Commissioner. The type of box, including its form and dimensions, must be appropriate for: its specific location; the kind of fixture to be used; and, the conduits (both quantity and type) that will connect to it. All ferrous outlet boxes must meet the requirements for zinc coating as specified under Electrical Conduit Systems.

8. Knockouts will only be opened to insert conduit. Any outlet boxes with more openings than are necessary for conduit insertion must be sealed by the Contractor without additional charge.

9. All outlet boxes and junction boxes for exposed work must be galvanized cast iron or cast aluminum with threaded openings. Outlet boxes for exposed inside work in damp locations must be galvanized cast iron or cast aluminum with threaded hubs and neoprene gaskets.

10. Junction boxes must not be less than 4 11/16" square and must be equipped with zinc coated plates. Where plates are exposed, they must be finished to match the room decor.

11. FIXTURE SUPPORTS: Outlet boxes supporting lighting fixtures must be equipped with fixture studs held by approved galvanized stove bolts or integral with the box. Cast iron or malleable boxes must have four (4) tapped holes for mounting required cover or fixtures.

12. Outlet boxes exposed to the weather or indicated W.P. must be cast iron or cast aluminum with the covers made watertight with neoprene gaskets. The boxes must have external lugs for mounting. Drilling of the body of the fitting for mounting will not be permitted. The cover screws must be appropriate in size, non-corrodible and not less than four (4) in number for each box opening.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.3

3.3 ELECTRICAL WIRING DEVICES:

A. WALL SWITCHES: must be of the best specification grade, quiet type, and must have a rating of 20 Amperes at 277 volts, as manufactured by Bryant, Hubbell or approved equal. The mechanism must be equipped with arc snuffers. They must be of the tumbler type, single pole. Switches of the 3-way type must have a similar rating.

B. RECEPTACLES:

1. CONVENIENCE OUTLETS: must be of the best specification grade, duplex, two-pole, 3-wire, 20 Amperes at 125 volts. It must have a grounding pole that must be grounded to the conduit system. Receptacles must be capable of both back and side wiring and must have only one (1) grounding screw. Receptacles must be Hubbell Catalog #5262 or approved equal.

2. HEAVY DUTY RECEPTACLE OUTLETS: must have the Ampere rating and the number of poles specified on the Contract Drawings and must be Hubbell, Russell-Stoll, Bryant, AH & H or approved equal. Each outlet must have a grounding pole, which must be grounded to the conduit system.

3. FLOOR RECEPTACLES: must be Russell & Stoll #3040 or approved equal, to fit into floor box previously specified.

4. NAMEPLATES: are required for all receptacles other than 120V.

C. CLOCK HANGERS: Clock outlets for surface type clocks must be equipped with a supporting hook and recessed faceplate to conceal the electrical cord.

D. WATERTIGHT DEVICES: For installations exposed to weather or in damp locations, the devices must be in a gasketed, cast iron enclosure.

E. PLATES:

1. Every convenience outlet and switch outlet must be covered by means of a stainless steel No. 302 - 0.4" antimagnetic plate with an approved finish, unless provided otherwise in the detailed Specifications.

2. Where two (2) or three (3) switches are grouped together, a single faceplate must be used. Where more than three (3) switches are located at one (1) point, the faceplates may be made up in multiple units.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4

3.4 ELECTRICAL CONDUCTORS AND TERMINATIONS:

A. CONDUCTORS FOR LIGHT AND POWER: All wire and cable must be of annealed copper of 98% conductivity. Aluminum wire or cable will not be permitted. The insulation must be flame retardant, moisture and heat resistant, thermoplastic, type THW or THWN rated for 600 volts at 75 degrees Celsius (C.) for both wet and dry locations. Wires No. 8 or larger must be stranded. Wires and cables must also

be subject to the requirements of the NYCEC. Cables for incoming service, or wire in conduits contiguous with the earth, in concrete, or other damp or wet locations, must be synthetic rubber insulated with neoprene jacket, heat and moisture resistant and must be equal to UL Type USE and rated for 600 volts at 75 degrees C. for both wet and dry locations.

B. FIXTURE WIRE: Lighting fixtures must be wired with No. 14 gauge wire designated as AWM and rated at 105 degrees C.

C. OTHER TYPES: Cables and wires for interior communication systems are described in applicable detailed Specifications.

D. MINIMUM SIZE: Conductors smaller than No. 12 AWG must not be used for light or power.

E. COLOR CODE: Wires must have a phase color code, and multiple conductor cables must be color coded.

F. CABLE DATA: The Contractor must submit for approval the following information for each size and type of cable to be furnished:

1. Manufacture of Cable - Location of Plant.

2. Minimum insulation resistance at standard test temperature.

3. Days required for delivery to site of work after order to proceed with manufacture.

G. ORIGINAL REELS: Cable and wire must be delivered to the site of the work on original sealed factory reels.

H. WIRE INSTALLATION:

1. INSTALL WIRES AFTER PLASTERING: Feeder and branch circuits wiring must not be installed into conduit before the rough plastering work is completed. No conductors must be pulled into floor conduits before floor is poured.

2. CONDUIT SECURED IN PLACE: No conductor must be pulled into any conduit run before all joints are made up tightly and the entire run rigidly secured in place.

3. WIRE ENDS: All wires must be left with sufficiently long ends for proper connection and stowing.

4. PULLING COMPOUNDS: to ease the pulling-in of wires into the conduit, only approved compounds as recommended by cable manufacturers must be used.

5. PRESSURE CONNECTORS: pressure connectors for wires must be of the cast copper or forged copper pressure plate type. Connectors must be O.Z., Burndy, National Electric Products or approved equal.

6. Splices and feeder taps in the gutters of panel boxes must be made by means of pressure plate-type connectors encased in composition covers as manufactured by O.Z., Burndy, National Electric Products or approved equal.

7. Splices in branch wiring for sound systems and fire systems, must be first made mechanically secure, then soldered and taped.

8. In lieu of soldered splices (except for sound and fire systems, which must have soldered splices) the following alternates are acceptable for operating temperatures up to 105 degrees C., for fluorescent fixtures and for the splicing of branch circuit wiring up to No. 8 AWG wire:

a. Mechanical splices made with mechanical connectors as manufactured by the Minnesota Manufacturing Company "Scotchlock" or approved equal. Mechanical connectors requiring a special tool (pressure connectors, insulators and locking rings) by Buchanan or approved equal. The tool used for connector application must be as approved by the connector manufacturer.

b. For branch circuit wire and cable No. 6 AWG and larger, the seamless tubular connector will only be accepted. Application of this connector must be with a tool recommended by the connector manufacturer.

9. TAGS: All feeders and risers must be tagged at both ends, and in all pull and junction boxes and gutter spaces through which they pass. Such tags must be of fiber and have the feeder designation and size stamped thereon.

10. BRANCH CIRCUIT WIRING:

a. The Contractor installing branch circuit wiring must test the work for correct connections and leave all loop splices in the fixture outlet boxes properly spliced and taped. The Contractor must provide wire ends long enough for convenient connection to device.

b. NEUTRALS: No common neutrals must be used except for lighting branch circuits. Each neutral wire must be terminated separately on a neutral busbar in the panelboard. No common neutrals will be permitted for convenience receptacle branch circuits.

I. TERMINATIONS

1. LUGS: All lugs for all devices and all cable terminations must be copper. AL/CU rated lugs will not be permitted. The only exception to this requirement is when the particular device is not manufactured with copper lugs by any manufacturer. Lugs for No. 6 AWG cable and larger must be cast copper or forged copper pressure plate type. Lugs for 1/0 and larger must be fastened with two (2) bolts.

2. All lugs must be of the proper size to accept the cable connected to them. Any Subcontractor furnishing a device containing lugs is to coordinate with the Contractor to ensure that the device terminations are adequate for the wire or cable (whose size may be larger than expected due to voltage drop considerations) connected to the device.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.5

3.5 CIRCUIT PROTECTIVE DEVICES:

This Section sets forth the circuit protective devices such as circuit breakers and safety switches, used in connection with Motor Control Equipment, Distribution Centers, Panel boards and Service Entrance.

A. CIRCUIT BREAKERS:

1. CIRCUIT BREAKERS: must be operable in any position and must be of the quick-make, quick-break type on manual operation. The handle must be trip free, preventing contacts from being held in closed position against abnormal overloads or short circuits. Positive visual indication of automatic tripped position of breaker must be provided, in addition to the "On" and "Off" indication. All circuit breakers must be of the bolted type.

2. TRIP RATING: Circuit breakers must be provided with the required number of trip elements, calibrated at 40 degrees C., ambient temperature, in accordance with wire sizes or motor currents as shown on Contract Drawings or indicated in the Specifications.

3. POLE BARRIER: Multipole pole breakers must be designed to break all poles simultaneously. They must be provided with barriers between poles and arc suppressing devices.

4. ELEMENTS: Multipole circuit breakers must have frames of not less than a 100 Ampere rating. Multipole circuit breakers for 480 volts AC operation must have an NEMA interrupting rating of 18,000 Amperes, unless a higher rating is specified in the Specifications or indicated on the Contract Drawings.

5. For circuit breakers with frame size up to and including 225 Amperes, the breakers may be

provided with non-interchangeable trip elements. For frame ratings above 225 Amperes, the breakers must be provided with interchangeable trip elements, which can be replaced readily.

6. Single pole circuit breakers for branch circuits must have a frame size of no less than 100 Amperes and must be rated at 125 volt A.C. with a NEMA interrupting rating of 10,000 Amperes, unless a higher rating is specified in the Specifications or indicated on the Contract Drawings.

7. INVERSE TIME ACTION: The circuit breakers must be dual element type, one (1) element with time limit characteristics, so that tripping will be prevented on momentary overloads, but will occur before dangerous values are reached and the other with instantaneous trip action. Inverse time delay action must be effective between a minimum tripping point of 125% of rating of breaker and an instantaneous tripping point between 600% and 700% of rated current.

8. CONSTANCY OF CALIBRATION: The tripping elements must ensure constant calibration and be capable of withstanding excessive short circuit conditions without injury.

9. CONTACTS: must be non-welding under operating conditions and of the silver to silver type.

10. TEMPERATURE RISE: Current carrying parts, except thermal elements, must not rise in temperature in excess of 30 degrees C. while carrying current at the part's rated current and frequency.

11. NUMBERING: Each circuit breaker must be distinctly numbered when installed in a group with other breakers. The calibration of trip element must be indicated on each breaker.

B. SAFETY SWITCHES:

NEMA TYPE HD: When safety switches are permitted to be used for service entrance, motor disconnecting means or to control other types of electrical equipment, they must be of the type HD of a rating not less than 30 Amperes. Enclosures must be provided with means for locking. For ratings above 60 Amperes terminals must have double studs.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.6

3.6 DISTRIBUTION CENTERS:

This Section sets forth the construction and installation procedure for Switchboards, Panel boards and Cabinets.

A. PANEL BOARDS, GENERAL TYPE: The panel boards must be of the automatic circuit breaker type with individual breakers for each circuit, removable without disturbing the other units. Circuit breakers must be in accordance with the requirements outlined under Section 3.5, "Circuit Protective Devices."

B. NUMBER AND RATING OF CIRCUIT BREAKERS: The Contract Drawings show a layout of each panel, giving the number, frame, size and trip setting of circuit breakers and number of branch circuits and spare breakers. Each branch circuit must be distinctly numbered.

C. BUS BAR CONSTRUCTION AND SUPPORT: Panel Boards must be of the dead front type and must have bus bars and branch circuits designed to suit the system and voltage. Current carrying parts, exclusive of circuit breakers, must be copper and based on a maximum density of 1,000 Amperes per square inch. Bus bars for the main switchboard must be designed for the frame rating of the Service Breaker. Bus bars must run up the center of the panel, unless otherwise indicated, and must have connected thereto the various branch circuits. Unless otherwise specified, bus bars for each panel board must be equipped with main lugs only and capacity as required on Contract Drawings. Where main protection is required, automatic circuit breakers must be used. A neutral bus of at least the same capacity as a live bus bar must be provided for the connection of all neutral conductors. Each terminal must be identified. All current carrying parts, exclusive of circuit breakers, must be of copper with a minimum number of joints. The bus bar structure must be a self-supporting unit, firmly fastened to a ½

inch plastic board, extending the full length and width of assembly which must serve to insulate the bus structure from the back of panel box. Other methods affording equally effective bus structure support and insulation will be given consideration. An insulating barrier must separate neutral bus from other parts of panel.

D. CIRCUIT BREAKER ASSEMBLY: The entire circuit breaker and bus bar assembly must be mounted on an adjustable metal base or pan and secured to the back of the panel box. The panel must have edges flanged for rigidity.

E. PANEL MOUNTING: The panel must be centered in the panel box, line up with the door openings, be set level and plumb, and no live parts may be exposed with the door open.

F. PANEL CABINET:

1. PANEL CABINET INSTALLATION: When installed, surface mounted in panel closets must be mounted on Kindorf channel.

2. Where cabinets cannot be set entirely flush due to mustow walls or partitions or where cabinet is extra deep, the protruding sides of cabinet must be trimmed with a metal or hardwood return molding of approved design and fastened to cabinet so as to conceal the intersection between the wall and cabinet.

G. NAMEPLATES: Where required, nameplates must be made of engraved Lamicoid sheet, or approved equal. Letters and numbers must be engraved white on a black background (except for Firehouse projects which must have white letters on a red background). The Contractor must submit an engraved sample for approval as to design and style of lettering before proceeding with the manufacture of the nameplate. Nameplates must be of suitable size and must also be provided at the top of the switchboard or section thereof and on the trim at the top of all lighting and power panels. Similar nameplates must also be provided for each distribution circuit breaker giving the breaker number, the number of the feeder, and the name of the equipment fed.

H. SHOP DRAWINGS: showing all details of boxes, panels, etc., must be submitted for approval.

I. DIRECTORIES: A directory must be fastened with brass screws and consist of a noncorrosive metal frame with dimensions not less than five (5) inches x eight (8) inches and a transparent window of Plasticile, Plexiglass, Lucite, Polycarbonate or approved equal that is not less than 1/16 inch thick over cardboard or heavy paper. The directory must be typewritten and show the number and name of each circuit, and lighting or equipment supplied. The size of riser feeder must be as indicated on the directory. The dimensions of the directory must be submitted for approval for each size of panel.

J. CONSTRUCTION

1. FINISH: Panel boxes, doors and trim for installation in dry locations, must be zinc coated after fabrication by the hot-dip galvanizing or electroplate process on inside and outside surfaces. In damp locations, panel boards must be enclosed and gasketed NEMA 3R type. Panel boards located outdoors or exposed to the weather must be NEMA 3X type.

2. PAINTING: Panel boxes, doors and trim must receive a coat of approved priming paint and a second coat of approved paint in the field after installation. Paint must be applied to the inside and outside of boxes and on both sides of trim. Panel trims and doors must receive a third or finishing coat on the outside after installation. Approval as to texture and color must be obtained before the final coat is applied.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.7

3.7 MOTORS:

This Section sets forth the general design, construction and performance requirements, which must apply to all motors furnished in the Contract.

A. MOTOR DESIGN: All motors must be designed to comply with the New York State Energy Conservation Construction Code and the New York City Energy Conservation Code. In the event of any conflict or inconsistency between such codes, the New York City Energy Conservation Code must prevail. Motors must have standard NEMA frames and must have nameplate ratings adequate to meet the specified conditions of operation. Motor performance under variable conditions of voltage and frequency must be within the limits set in NEMA standards, unless modified in the Specifications. Motors must be expressly designed for the hazard duty load, voltage and frequency as specified in the Contract. All motor windings must be copper. All motors intended to operate on a 208 volt system must be designed and rated for 200 volts.

B. STANDARDS OF COMPARISON: In the absence of specific motor specifications, in general, the best standard products of the leading motor manufacturers must be considered as a standard for comparison. The requirements of the NEMA standards for motors and generators must be deemed to contain the minimum requirements of performance and design.

C. OBJECTIONABLE NOISES: Objectionable noises will not be tolerated and exceptionally quiet motors may be required for certain specified locations. Noise control tests as per the New York City Construction Codes may be performed as directed by the Commissioner. Such motors must bear a nameplate lettered "Quiet Motor." Springs and slip rings must be of approved non-ferrous material.

D. BEARINGS:

1. Bearings, unless specified otherwise, must be of the ball or roller type. Motors one (1) horsepower and larger that are equipped with ball roller bearings must also have lubrication of the pressure-relief greasing type. The Contractor furnishing four (4) or more such motors must also furnish, as part of the Contract, a pressure grease gun of rugged design, of approximately ten (10) ounce capacity, complete with necessary adapters. The Contractor must also provide ten (10) pounds of approved gun grease.

2. For any particular unit where sleeve bearings are deemed desirable, permission for their use may be granted by the Commissioner. Motors one (1) horsepower and larger that are equipped with sleeve type bearings must, in addition to having protected fittings easily accessed for oiling, be provided with visible means for determining normal oil level. Lubrication must be positive, automatic and continuous.

E. MOTOR TERMINALS AND BOXES: Each motor must be furnished with flexible leads of sufficient length to extend for a distance of not less than three (3) inches beyond the face of the conduit terminal box. This box must be furnished of ample size to make and house motor connections. These requirements must be met irrespective of any other standards or practices. Size of cable terminals and conduit terminal box holes must be subject to approval. For motors five (5) horsepower or larger, each terminal must come with two (2) cast or forged copper pressure type connectors with bolts, nuts and washers. For motors of smaller ratings, connectors of other acceptable types may be furnished. For installations exposed to the weather or moist locations, terminal boxes must be of cast iron with threaded hubs and gasketed covers. Cover screws must be of non-corrosive material.

F. MOTOR TEMPERATURE RISES: The motor nameplate temperature rises for the various types of motor enclosures must be as listed below:

1.	Open Frame	40 degrees C.
2.	Totally enclosed and enclosed fan cooled	55 degrees C.
3.	Explosion proof and submersible	55 degrees C.

4. Partially enclosed and drip proof 40 degrees C.

The temperature of the various parts of a motor must meet the requirements of NEMA standards for the size and type of the motors. Tests for heating must be made by loading the motor to its rated horsepower and keeping it so loaded for the rated time interval or until the temperature becomes constant.

G. SPECIAL CODE INSTALLATIONS: Electrical installations covered by special publications of NBFU and by special City rulings and regulations must comply in design and safety features with such applicable codes, regulations and rulings, and must be furnished and installed complete with all accessories and safety devices as therein specified.

H. MOTORS ON LIGHTING PANELS: The largest A.C. motor permitted on branch circuits of lighting panels must not exceed 1/4 horsepower.

I. MOTORS RATED: ½ horsepower and larger must be polyphase.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8

3.8 MOTOR CONTROL EQUIPMENT:

This Section sets forth the requirements for motor controllers and associated devices. Such requirements are applicable to all motor control equipment furnished or installed.

A. MANUFACTURER: All control equipment furnished under the Contract must be the product of a single manufacturer. Exceptions to this rule may be granted in the case of controllers for fractional horsepower motors driving special equipment, the various units of which have been engineered to obtain specific performance.

B. CONTROL ITEMS REQUIRED: The Contractor furnishing motors must also furnish therewith complete disconnecting, starting and control equipment as required by the detailed Specifications, the various code authorities and for the successful operation of the driven equipment. These items include circuit breakers, magnetic starters with overload protection and low voltage release or protection, push button stations, pilot lights and alarms, float, pressure, temperature and limit switches, load transfer switches, devices for manual operation and speed controllers, etc. The Contractor must furnish as many of these items as required for the successful operation of the driven unit.

1. Where a motor is to be located out of sight of the controller, the Contractor must furnish an approved disconnecting means to be mounted near motor.

C. TYPES OF STARTERS:

1. SQUIRREL CAGE: A.C. motors of the squirrel cage type, rated from one (1) to thirty (30) horsepower, must have magnetic across the line starters; motors rated above thirty (30) horsepower must be furnished with reduced voltage (autotransformer type) starter or part winding start with time delay to reduce inrush current. Size of starters must be based on 200V operation.

2. SLIP RING: A.C. motors of the slip-ring type must be furnished with primary across the line starters interlocked with secondary starting and regulating equipment. The interlocking feature must prevent starting of the motor when the secondary controller is off the initial starting point.

3. MAGNETIC: For fractional horsepower motors, magnetic type starters are not required unless the particular method of controlling the driven equipment makes them necessary. Where individual single phase fractional horsepower motors or the sum of fractional horsepower motors controlled by an automatic device are ½ horsepower or more, magnetic starters and circuit breakers must be used. Single phase A.C. motors smaller than ½ horsepower or three-phase A.C. motors smaller than one (1) horsepower where manual control is specified may be furnished with starters of toggle switch or push button type with inbuilt thermal protection. No additional disconnecting means is required to be furnished with this type of starter. This type of starter may also be used in series

with automatic control devices such as thermostats, float and pressure switches, provided the individual motor or the sum of fractional horsepower motors is less than ½ horsepower. Means for manual operation must be provided.

D. DISCONNECTING BREAKER: All motor starters, unless otherwise specified, must be provided with a disconnecting means in the form of a circuit breaker of the type specified under Article 3.5 CIRCUIT PROTECTIVE DEVICES. This disconnecting means must be contained in the same housing with the starter and must be operable from outside. Means must be provided for locking the handle of the circuit breaker in the "OFF" position if it is desired to take the equipment out of service and prevent unauthorized starting.

E. CONTROL CABINET – DRY LOCATIONS: All starters must be furnished with general purpose, NEMA Type 1, sheet metal enclosures with hinged covers and baked enamel finish.

F. CONTROL CABINET – WATERTIGHT: In wet locations, cast iron watertight enclosures with threaded hubs, galvanized and gasketed hinged covers must be provided.

G. PANELS: Motor control devices and appliances must be mounted on approved insulating slabs with all wiring and connections made on the back of the slabs.

H. WIRING AND TERMINALS: Wiring connections for currents of one hundred (100) Amperes or less may be made with copper wire or cable with special flameproof insulating coverings. Such wires must be installed in a neat workmanlike manner, flat against the slab, and held in place by clips. Connections must be made with pressure connectors for No. 8 AWG and larger wires, and with grommets for small, stranded wires. Except for incoming and outgoing main leads, all connections must terminate on approved connector blocks, which may be installed on the face of the slab. For small, across the line starters, the above requirements may be modified if satisfactory connections are provided.

I. COPPER BUS: For currents exceeding one hundred (100) Amperes, copper bus must be used in place of wires. The bus must be constructed of copper rods, tubing or flat strap, bent and shaped properly and securely attached to the slab in a neat and workmanlike manner. The cross section of copper must provide sufficient areas to keep current density at not more than one thousand (1,000) Amperes per square inch.

J. COOPERATION: The Contractor's Subcontractor(s) who furnish electrically operated equipment must give to the Contractor and the Contractor's electrical Subcontractor full information relative to sizes and locations of apparatus furnished by them which require electrical connections.

END OF SECTION 01 35 06

SECTION 01 35 26
SAFETY REQUIREMENTS PROCEDURES

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

B. The Contractor shall comply with the requirements of "*The City of New York Department of Design and Construction Safety Requirements".* This document is included in the Information for Bidders.

1.2 SUMMARY:

A. This Section includes administrative and general procedural requirements for Safety and Health Requirements, including:

1. Definitions
2. Required Safety Meeting
3. Compliance with Regulations
4. Submittals
5. Personnel Protective Equipment
6. Hazardous and / or Contaminated Materials
7. Emergency Suspension of Work
8. Protection of Personnel
9. Environmental Protection

1.3 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: "Design Consultant" must mean the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.4 REQUIRED SAFETY MEETINGS:

A. Prior to commencing construction, the Resident Engineer will schedule and hold a preconstruction kick-off meeting either at DDC's main office or at the Project site with representatives of the Contractor, including the principal on-site project representative, one or more safety representatives, the Commissioner's designated representatives and other concerned parties for the purpose of reviewing the Contract safety requirements. Additionally, implementing Work safety provisions must be discussed.

B. The Contractor is responsible for conducting weekly documented jobsite safety meetings, given to all jobsite personnel including all Subcontractors on the Project, with the purpose of discussing safety topics and job-specific requirements at the DDC worksite.

1.5 COMPLIANCE WITH REGULATIONS:

A. The Work, including contact with or handling of hazardous materials, disturbance or dismantling of structures containing hazardous materials, and disposal of hazardous materials, shall comply with the applicable requirement for 29 CFR Parts 1910 and 1926, and 40 CFR, Parts 61, 261, 761 and 763.

B. Work involving disturbance or dismantling of asbestos or asbestos-containing materials, demolition of structures containing asbestos and removal of asbestos, shall comply with 40 CFR Part 61, Subparts A and M, and 40 CFR Part 763, as applicable.

C. Additionally, Work shall comply with all applicable federal, state, and local safety and health regulations.

D. In case of a conflict between applicable regulations, the more stringent requirements shall apply.

E. All workers working on the DDC Project site are required by NYC Local Law 41 to complete the OSHA 10-hour training course.

1.6 SUBMITTALS:

A. The Contractor shall submit to the Resident Engineer, copies of the Safety Program, Site Safety Plan and other required documentation in accordance with the "*New York City Department of Design and Construction Safety Requirements*".

B. Permits: If hazardous materials are disposed of off-site, the Contractor must submit to the Resident Engineer copies of shipping manifests, permits from applicable federal, state, or local authorities and disposal facilities, and certificates that the material has been disposed of in accordance with regulations.

C. Accident Reporting: Submit a copy of each accident report to the Resident Engineer in accordance with the "*New York City Department of Design and Construction Safety Requirements*".

D. All asbestos and lead project regulatory notifications are to be submitted to DDC's Office of Environmental and HazMat Services (OEHS) through the Resident Engineer.

E. Request for Subcontractor Approval: Any Subcontractor performing environmental work must submit required documentation for approval to perform such work as required by DDC's OEHS.

PART II – PRODUCTS

2.1 PERSONNEL PROTECTIVE EQUIPMENT:

A. Special facilities, devices, equipment, and similar items used by the Contractor in execution of the Work shall comply with 29 CFR Part 1910, subpart I, Part 1926, subpart E, and other applicable regulations.

2.2 HAZARDOUS AND / OR CONTAMINATED MATERIALS:

A. The Contractor shall bring to the attention of the Commissioner, any material encountered during execution of the Work that the Contractor suspects to be hazardous and / or contaminated.

B. The Commissioner shall determine whether the Contractor shall perform tests to determine if the material is hazardous and / or contaminated. A change to the Contract price may be provided, subject to the applicable provisions of the Contract.

C. If the material is found to be hazardous, the Commissioner may direct the Contractor to remediate the hazard and a change to the Contract price may be provided, subject to the applicable provisions of the Contract.

PART III – EXECUTION

3.1 EMERGENCY SUSPENSION OF WORK:

A. When the Contractor is notified by the Commissioner of noncompliance with the safety provisions of the Contract, the Contractor shall immediately, unless otherwise instructed, correct the unsafe condition, at no additional cost to the City.

B. If the Contractor fails to comply promptly, all or part of the Work may be stopped by notice from the Commissioner.

C. When, in the opinion of the Commissioner, theContractor has taken satisfactory corrective action, the Commissioner shall provide written notice to the Contractor that the Work may resume.

D. The Contractor shall not be allowed any extension of time or compensation for damages in connection with a work stoppage for an unsafe condition.

3.2 PROTECTION OF PERSONNEL:

A. The Contractor shall take all necessary precautions to prevent injury to the public, occupants, or damage to property of others. The public and occupants includes all persons not employed by the Contractor or a Subcontractor.

B. Whenever practical, the work area shall be fenced, barricaded, or otherwise blocked off from the public or occupants to prevent unauthorized entry into the work area, in compliance with the requirements of Section 01 50 00 TEMPORARY FACILITIES, SERVICES AND CONTROLS, and including without limitation, the following:

1. Provide traffic barricades and traffic control signage where construction activities occur in vehicular areas.
2. Corridors, aisles, stairways, doors, and exit ways shall not be obstructed or used in a manner to encroach upon routes of ingress or egress utilized by the public or occupants, or to present an unsafe condition to the public or occupants.
3. Store, position and use equipment, tools, materials, scraps and trash in a manner that does not present a hazard to the public or occupant by accidental shifting, ignition, or other hazardous activity.
4. Store and transport refuse and debris in a manner to prevent unsafe and unhealthy conditions for the public and occupants. Cover refuse containers and remove refuse on a frequent regular basis acceptable to the Resident Engineer. Use tarpaulins or other means to prevent loose transported materials from dropping from trucks or other vehicles.

3.3 ENVIRONMENTAL PROTECTION:

A. Dispose of solid, liquid and gaseous contaminants in accordance with local codes, laws, ordinances and regulations.

B. Comply with applicable federal, state, and local noise control laws, ordinances, and regulations, including but not limited to 29 CFR 1910.95, 29 CFR 1926.52 and NYC Administrative Code Chapter 28 of Title 15.

END OF SECTION 01 35 26

SECTION 01 35 91
HISTORIC TREATMENT PROCEDURES

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 35 91

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section includes administrative and procedural requirements for the treatment of Landmark Structures and Landmark Quality Structures, as identified in the Addendum. Specific requirements are indicated in other sections of the Specifications.

B. This Section includes, without limitation, the following:

1. Storage and protection of existing historic materials
2. General Protection
3. Protection during use of heat-generating equipment
4. Photographic Documentation
5. NYC Landmarks Preservation Commission Final Approval signoffs

1.3 RELATED SECTIONS: include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION
C. Section 01 33 00 SUBMITTAL PROCEDURES
D. Section 01 77 00 CLOSEOUT PROCEDURES
E. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: “Design Consultant” means the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the “Design Consultant” may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

C. Landmark Structure or Site: Any building or site which has been designated as a landmark, or any building or site within a landmark district, as designated by the New York City (NYC) Preservation Commission or the New York State Historic Preservation Office.

D. Landmark Quality Structure: Any building which has been determined by the City to be of landmark quality and/or historical significance.

E. Preservation: To apply measures necessary to sustain the existing form, integrity, and materials of a historic property. Work may include preliminary measures to protect and stabilize the property.

F. Rehabilitation: To make possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features that convey its historical, cultural, or architectural values.

G. Restoration: To accurately depict the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and the reconstruction of missing features from the restoration period.

H. Reconstruction: To reproduce in the exact form and detail a building, structure, or artifact as it appeared at a specific period in time.

I. Stabilize: To apply measures designed to reestablish a weather-resistant enclosure and the structural reinforcement of an item or portion of the building while maintaining the essential form as it exists at present.

J. Protect and Maintain: To remove deteriorating corrosion, reapply protective coatings, and install protective measures such as temporary guards; to provide the least degree of intervention.

K. Repair: To stabilize, consolidate, or conserve; to retain existing materials and features while employing as little new material as possible. Repair includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials. Within restoration, repair also includes limited replacement in kind, rehabilitation, and reconstruction, with compatible substitute materials for deteriorated or missing parts of features when there are surviving prototypes.

L. Replace: To duplicate and replace entire features with new material in kind. Replacement includes the following conditions:

1. Duplication: Includes replacing elements damaged beyond repair or missing. Original material is indicated as the pattern for creating new duplicated elements.
2. Replacement with New Materials: Includes replacement with new material when original material is not available as patterns for creating new duplicated elements.
3. Replacement with Substitute Materials: Includes replacement with compatible substitute materials. Substitute materials are not allowed, unless otherwise indicated.

M. Remove: To detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

N. Remove and Salvage: To detach items from existing construction and deliver them to the City ready for reuse.

O. Remove and Reinstall: To detach items from existing construction, repair and clean them for reuse, and reinstall them where indicated.

P. Existing to Remain or Retain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled.

Q. Material in Kind: Material that matches existing materials as much as possible, in species, cut, color, grain, and finish.

1.5 SUBMITTALS:

A. Historic Treatment Program: Submit a written plan for each phase or process, including protection of surrounding materials during operations. Describe in detail materials, methods, and equipment to be used for each phase of the Work.

B. Alternative Methods and Materials: If alternative methods and materials to those indicated are proposed for any phase of the Work, submit for the Commissioner's approval a written description, including

evidence of successful use on other comparable projects and provide a program of planned testing to demonstrate the effectiveness of the alternative methods and materials for use on this Project.

C. Qualification Data: Submit qualification data for historic treatment specialists as specified and required by individual sections of the Project specifications.

D. Photographs for Designated Landmark Structures: Submit photographs in accordance with Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION and as described in this section.

E. Record Documents: Include modifications to manufacturer's written instructions and procedures, as documented in the historic treatment preconstruction conference and as the Work progresses.

1.6 QUALITY ASSURANCE:

A. Historic Treatment Specialist Qualifications: Refer to Section 01 40 00 QUALITY REQUIREMENTS for Qualifications for Historic Treatment Specialists.

B. Historic Treatment Preconstruction Conference: The Resident Engineer will schedule and hold a preconstruction meeting at the site in accordance with Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION.

1. Review manufacturer's written instructions for precautions and effects of products and procedures on building materials, components, and vegetation.

a. Record procedures established as a result of the review and distribute to affected parties.

1.7 STORAGE AND PROTECTION OF HISTORIC MATERIALS:

A. Removed and Salvaged Historic Materials: As specified and required by individual sections of the Project specifications.

B. Removed and Reinstalled Historic Materials: As specified and required by individual sections of the Project specifications.

C. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling during historic treatment. When permitted by the Commissioner, items may be removed to a suitable, protected storage location during historic treatment and reinstalled in their original locations after historic treatment operations are complete.

D. Storage and Protection: When removed from their existing location, store historic materials, at a location acceptable to the Commissioner, within a weather tight enclosure where they are protected from wetting by rain, snow, or ground water, and temperature variations. Secure stored materials to protect from theft.

1. Identify removed items with an inconspicuous mark indicating their original location.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

3.1 GENERAL PROTECTION:

A. Comply with manufacturer's written precautions against harmful effects of products and procedures on adjacent building materials, components, and vegetation.

B. Ensure that supervisory personnel are present when work begins and throughout its progress.

C. Temporary Protection of Historic Materials during Construction:

1. Protect existing materials during installation of temporary protections and construction. Do not deface or remove existing materials.

2. Attachments of temporary protection to existing construction must be approved by the Commissioner prior to installation.

D. Protect landscape work adjacent to or within work areas as follows:

1. Provide barriers to protect tree trunks.
2. Bind spreading shrubs.
3. Use coverings that allow plants to breathe and remove coverings at the end of each day. Do not cover plant material with a waterproof membrane for more than eight (8) hours at a time.
4. Set scaffolding and ladder legs away from plants.

E. Existing Drains: Prior to the start of work or any cleaning operations, test drains and other water removal systems to ensure that drains and systems are functioning properly. Notify the Commissioner immediately of drains or systems that are stopped or blocked. Do not begin Work pertaining to this Section until the drains are in working order.

1. Provide a method to prevent solids, including stone or mortar residue, from entering the drains or drain lines. Clean out drains and drain lines that become blocked or filled by sand or any other solids because of the Work performed under this Contract.
2. Protect storm drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

3.2 PROTECTION DURING USE OF HEAT-GENERATING EQUIPMENT:

A. No roofing work requiring the use of an open flame will be permitted on any Landmark Structure or any Landmark Quality Structure whose roof or wall structure is made of wood or primarily of wood.

B. Comply with the following procedures while performing work with heat-generating equipment, including welding, cutting, soldering, brazing, paint removal with heat, and other operations where open flames or implements utilizing heat are used:

1. Obtain Commissioner's approval for operations involving use of open-flame or welding equipment. Notification must be given for each occurrence and location of work with heat-generating equipment.
2. Where possible, use heat-generating equipment in shop areas or outside the building.
3. Before work with heat-generating equipment commences, furnish personnel to serve as a fire watch (or watches) for location(s) where work is to be performed.
4. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
5. Remove and keep the area free of combustibles, including rubbish, paper, waste, etc., within the area of operations.
6. If combustible material cannot be removed, provide fireproof blankets to cover such materials.
7. Where possible, furnish and use baffles of metal or gypsum board to prevent the spraying of sparks or hot slag into surrounding combustible material.
8. Prevent the extension of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
9. Inspect each location of the day's work not sooner than thirty (30) minutes after completion of operations to detect hidden or smoldering fires and to ensure that proper housekeeping is maintained.

C. Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to automatic sprinkler heads, shield the individual heads temporarily with guards.

3.3 PHOTOGRAPHIC DOCUMENTATION:

A. Photographs for Designated Landmark Structures: Show existing conditions prior to any historic treatments, including one overall photograph and two close-up photographs of all areas of work affected. Show one overall photograph and two close-up photographs of all areas of work after the successful execution of all historical treatments.

3.4 NEW YORK CITY LANDMARKS PRESERVATION COMMISSION FINAL APPROVALS SIGNOFF:

A. For all projects involving a Landmark Structure or Site, the Contractor, at the completion of the Work, must submit to the Commissioner, in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS, all documentation concerning the successful execution of all historic treatments. This must include, but not be limited to, copies of all before and after photographs of historic treatments, one copy of the GC Contractor's as-built drawings, copies of testing and analysis results, including cleaning, mortar analysis, pointing mortars and all other information pertaining to work performed under the NYC Landmarks Preservation Commission jurisdiction.

END OF SECTION 01 35 91

SECTION 01 40 00
QUALITY REQUIREMENTS

PART I - GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section includes the following:

1. Definitions
2. Engineering Services
3. Conflicting Requirements
4. Quality Assurance
5. Quality Control
6. Approval of Materials
7. Special Inspections (Controlled Inspection)
8. Inspections by Other City Agencies
9. Certificates of Approval
10. Acceptance Tests
11. Repair and Protection

B. This section includes administrative and procedural requirements for quality control to assure compliance with quality requirements specified in the Contract Documents.

C. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Documents.

D. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and quality control procedures that facilitate compliance with the Contract Documents.

E. Provisions of this section do not limit requirements for the Contractor to provide quality assurance and quality control services required by the Commissioner or authorities having jurisdiction.

F. Specific test and inspection requirements are specified in the individual sections of the Specifications.

G. LEED: Refer to the Addendum to identify whether the Project is designed to comply with a Certification Level according to the U.S. Green Building Council's Leadership in Energy & Environmental Design (LEED) Rating System, as specified in Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS.

H. COMMISSIONING: Refer to the Addendum to identify whether the Project will be commissioned by an independent third party under separate contract with the City of New York. Commissioning must be in accordance with ASHRAE and USGBC LEED-NC procedures, as described in Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS and/ or Section 01 91 15 GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE. The Contractor must cooperate with the Commissioning Agent and provide whatever assistance is required.

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 10 00 SUMMARY

B. Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION

C. Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION

D. Section 01 33 00 SUBMITTAL PROCEDURES

E. Section 01 77 00 CLOSEOUT PROCEDURES

F. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. Design Consultant: "Design Consultant" means the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (Drawings and Specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

C. Commissioning: A Total Quality Assurance process that includes checking the design and installation of equipment, as well as performing functional testing of the same to confirm that the installed equipment is operating and in conformance with the Contract Documents and the City's requirements.

D. Experienced: When used with an entity or individual, "experienced," means having minimum experience levels as described in Article 1.7, Paragraph B "Minimum Experience qualification levels."

E. Installer/ Applicator/ Erector: Contractor or another entity engaged by Contractor as an employee or Subcontractor, to perform a particular construction operation, installation, erection, application, assembly and similar operations.

F. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under sample Submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

G. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

H. Product Tests: Tests and inspections that are performed by a Nationally Recognized Testing Laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

I. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.

J. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory means the same as testing agency.

K. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

L. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements.

1.5 ENGINEERING SERVICES

A. Performance and Design Criteria: Where professional design services provided by a professional engineer are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are insufficient to perform services or certification required, submit a written request for clarification to the Commissioner.

1.6 CONFLICTING REQUIREMENTS:

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, the Contractor must comply with the most stringent requirement. The Contractor must refer any uncertainties and/or conflicting requirements to the Commissioner for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified must be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. The Contractor must refer any uncertainties to the Commissioner for a decision before proceeding.

1.7 QUALITY ASSURANCE:

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required. Individual Specification Sections may specify supplementary qualification requirements.

1. **Minimum Experience**: Minimum Experience qualification levels as described herein, apply to all entities indicated in the Specification Sections for the Project, unless such entity requires Special Experience requirements per Subsection 1.7 A.2. below. Individual Specification Sections may specify supplementary qualification requirements.

2. **Special Experience**: Special Experience qualification levels as described herein, apply to all entities indicated in the "Special Experience Requirements" page of the PASSPort procurement. Individual Specification Sections may specify supplementary qualification requirements.

B. **Minimum Experience qualification levels:**

1. **Qualifications for Installer or Applicator or Erector**: An entity complying with the requirements of authorities having jurisdiction and having, prior to the bid opening, been regularly engaged for a minimum of three (3) consecutive years in installing, erecting, applying, or assembling work in a timely fashion similar in material, design, and extent to that indicated for the Project, and whose

work has resulted in construction with a record of successful in-service performance.

2. **Qualifications for Installer or Applicator or Erector requiring approval or certification or authorization by Manufacturer**: An entity complying with the requirements of authorities having jurisdiction and having, prior to the bid opening, been regularly engaged for a minimum of three (3) consecutive years in installing, erecting, applying, or assembling work in a timely fashion similar in material, design, and extent to that indicated for the Project, and whose work has resulted in construction with a record of successful in-service performance. In addition, the entity must be approved, or certified, or authorized by the manufacturers listed in the Specification Section and must be eligible to receive manufacturers' warranty.

3. **Qualifications for Fabricator**: An entity complying with the requirements of authorities having jurisdiction; having, prior to the bid opening, been regularly engaged for a minimum of three (3) consecutive years in producing products similar to those indicated for the Project and having a record of successful in-service performance, as well as sufficient production capacity to produce required units.

4. **Qualifications for Manufacturer**: An entity complying with the requirements of authorities having jurisdiction; having, prior to the bid opening, been regularly engaged for a minimum of three (3) consecutive years in manufacturing products or systems similar to those indicated for the Project; having a record of successful in-service performance for not less than three (3) consecutive years and having sufficient production capacity to produce required units. Manufacturer must meet warranty requirements and technical or factory-authorized service representative requirements.

5. **Qualifications for Specialist:** An entity complying with the requirements of authorities having jurisdiction; satisfying qualification requirements indicated in the Specification Section and having, prior to the bid opening, a minimum of three (3) consecutive years successfully engaged in the activities indicated.

C. **Special Experience Qualification Levels:**

1. **Special Qualifications for Installer or Applicator or Erector**: An entity complying with the requirements of authorities having jurisdiction and having, prior to the bid opening, been regularly engaged for a minimum of five (5) consecutive years in successfully installing, erecting, applying, or assembling work similar in material and design to that indicated for the Project. Entity must provide documentation of having successfully completed a minimum of three (3) projects similar in scope, size and type as required for the Project.

2. **Special Qualifications for Fabricator**: An entity complying with the requirements of authorities having jurisdiction; having, prior to the bid opening, been regularly engaged for a minimum of five (5) consecutive years in producing products similar to those indicated for the Project; having a record of successful in-service performance, as well as sufficient production capacity to produce required units. Entity must provide documentation of having successfully completed a minimum of three (3) projects similar in nature, size, and extent, to the requirements of the project.

3. **Special Qualifications for Installer of a Manufacturer-Warrantied Roof System:** An entity complying with the requirements of authorities having jurisdiction; regularly engaged in performing roofing projects with its own workforce; having successfully completed in a timely fashion within the last three (3) consecutive years prior to the bid opening, at least three (3) roofing projects similar in scope, size and type to the required Project, and having performed at least one (1) of those projects in the last twelve (12) months. The three (3) qualifying projects must have utilized one or more of the roofing systems specified for the project being bid herein,

been installed by the entity utilizing its own workforce and must have qualified for, and have been issued, the warranty provided by the manufacturer of the roofing system. In addition, the entity must be a certified or authorized installer for the manufacturer's roofing systems specified herein and must submit proof of same.

4. **Special Qualifications for Installer of Roof tie-in to maintain existing Roof System Warranty:** An entity complying with the requirements of authorities having jurisdiction; regularly engaged in performing roofing projects with its own workforce; having successfully completed in a timely fashion within the last three (3) consecutive years prior to the bid opening, at least three (3) roofing projects similar in scope, size and type to the required Project, and having performed at least one (1) of those projects in the last twelve (12) months. The three (3) qualifying projects must have utilized the manufacturer and manufacturer's Product, been installed by the entity utilizing its own workforce and must have qualified for, and have been issued, the warranty provided by the manufacturer listed in the technical specification. In addition, the entity must be a certified or authorized installer for this manufacturer's specified roofing system specified herein and must submit proof of same.

5. **Special Qualifications for Manufacturer:** An entity complying with the requirements of authorities having jurisdiction; having, prior to the bid opening, been regularly engaged for a minimum of five (5) consecutive years in manufacturing products or systems similar to those indicated for the Project; having completed a minimum of three (3) projects similar in nature, size, and extent, to the requirements of the project; having a record of successful in-service performance, as well as sufficient production capacity to produce required units. Manufacturer must meet warranty requirements, and technical or factory-authorized service representative requirements.

6. **Special Qualifications for Historic Treatment Specialist:** An entity complying with the requirements of authorities having jurisdiction and having prior to the bid opening, been regularly engaged for a minimum of five (5) consecutive years in successfully completing in a timely fashion project similar in scope, size, and type to the required work, based on architectural style, construction method and materials and age of building for the project. Entity must provide documentation of having successfully completed a minimum of three (3) projects similar in scope, size and type as required for the Project, and where at least one (1) such prior project of the three (3) must have involved a landmarked building, as officially designated by the City, State, or Federal government.

D. Professional Engineer Qualifications: A professional engineer who is licensed and registered to practice in the State of New York and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for the Project in material, design, and extent.

E. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for the Project.

F. Testing Agency Qualifications: A Nationally Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E329 (Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection); and with additional qualifications specified in individual Specification Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

G. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:
   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
   d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
   e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
   f. When testing is complete, remove test specimens and test assemblies, and mockups, and laboratory mockups; do not reuse products on Project.
2. Testing Agency Responsibility: Submit a certified written report of each test, inspection, and similar quality-assurance service to Commissioner, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

H. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
   1. Build mockups in location and of size indicated or, if not indicated, as directed by the Commissioner.
   2. Notify Commissioner seven (7) days in advance of dates and times when mockups will be constructed.
   3. Demonstrate the proposed range of aesthetic effects and workmanship.
   4. Obtain Commissioner's approval of mockups before starting work, fabrication, or construction.
   5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   6. Demolish and remove mockups when directed, unless otherwise directed or indicated.

I. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings or as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph in this Section.

J. Room Mockups: Construct room mockups according to approved Shop Drawings or as indicated on Drawings, incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Commissioner to evaluate quality of the Work. Comply with requirements in "Mockups" Paragraph in this Section.

K. Laboratory Mockups: Comply with the requirements of preconstruction testing and those specified in individual Specification Sections.

1.8 QUALITY CONTROL:

A. City's Responsibilities: Where quality-control services are indicated as the City's responsibility in the Specifications, the City will engage a qualified testing agency to perform these services. (Refer to Special Inspections Article 1.10.)
   1. COST OF TESTS BORNE BY THE CITY: Where the City directs tests to be performed to determine compliance with the Specifications regarding materials or equipment, and where such compliance is ascertained as a result thereof, the City will bear the cost of such tests.
   2. The City will furnish the Contractor with names, addresses, and telephone numbers of testing entities engaged and a description of the types of testing and inspecting they are engaged to perform.

3. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to the Contractor.

B. Contractor's Responsibility: Tests and inspections not explicitly assigned to the City are the Contractor's responsibility. Unless otherwise indicated, the Contractor must provide quality control services as set forth in the Specifications and those required by authorities having jurisdiction, whether specified or not.

1. COST OF TESTS BORNE BY CONTRACTOR - In the case of tests which are specifically called for in the Specifications to be provided by the Contractor or tests which are required by any authority having jurisdiction, but are not indicated as the responsibility of the City, the cost thereof will be borne by the Contractor and will be deemed to be included in the Contract price. The Contractor must reimburse the City for expenditures incurred in providing tests on materials and equipment submitted by the Contractor as the equivalent of that specifically named in the Specifications and rejected for non-compliance.
2. Where services are indicated as Contractor's responsibility, the Contractor must engage a qualified testing agency to perform these quality-control services. Any testing agency engaged by the Contractor to perform quality control services is subject to prior approval by the Commissioner.
3. The Contractor must not employ same entity engaged by the City, unless agreed to in writing by the Commissioner.
4. The Contractor must notify testing agencies and the Commissioner at least 72 hours in advance of the date and time for the performance of Work that requires testing or inspecting.
5. Where quality control services are indicated as Contractor's responsibility, the Contractor must submit a certified written report of each quality-control service, in triplicate, to the Commissioner.
6. Testing and inspecting requested by the Contractor and not required by the Contract Documents are Contractor's responsibility.
7. The Contractor must submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, the Contractor must engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Results must be submitted in writing as specified in Section 01 33 00 SUBMITTAL PROCEDURES. Manufacturer's field representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Re-inspecting: Regardless of whether the original tests or inspections were the Contractor's responsibility, the Contractor must provide quality control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Commissioner and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Commissioner and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

F. Associated Services: The Contractor must cooperate with entities performing required tests, inspections, and similar quality control services, and must provide reasonable auxiliary services as requested. The

Contractor must notify the testing agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist testing entity in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing entities.
6. Design mix proposed for use for material mixes that require control by the testing entity.
7. Security and protection for samples and for testing and inspecting equipment at the Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality assurance and quality control services with minimal delay and avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

2. Coordinate and cooperate with the Commissioning Authority/Agent as applicable for start-up, inspection and functional testing in the implementation of the Commissioning Plan.

H. Manufacturer's Directions: Where the Specifications provide that the manufacturer's directions are to be used, such printed directions must be submitted to the Commissioner.

I. Inspection of Material: In the event that the Specifications require the Contractor to engage the services of an entity to witness and inspect any material specially manufactured or prepared for use in or part of the permanent construction, such entity will be subject to prior written approval by the Commissioner.

1. NOTICE - The Contractor must give notice in writing to the Commissioner, sufficiently in advance of its intention to commence the manufacture or preparation of materials specially manufactured or prepared for use in or as part of the permanent construction. Such notice must contain a request for inspection, the date of commencement, and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the Commissioner will arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials, or the Commissioner will notify the Contractor that the inspection will be made at a point other than the point of manufacture, or the Commissioner will notify the Contractor that inspection will be waived.

J. No Shipping Before Inspection: The Contractor must comply with the foregoing before shipping any material.

K. Certificate of Manufacture: When the Commissioner so requires, the Contractor must furnish to the Commissioner, authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the Work have been manufactured and tested in conformity with the Specifications. These certificates must include copies of the results of physical tests and chemical analyses where necessary, that have been made directly on the product, or on similar products being fabricated by the manufacturer. This may include such approvals as the Bureau of Standards and Appeals (B.S.A.), the Materials and Equipment (M.E.A.) acceptance Index, the Bureau of Electrical Control (B.E.C.), etc.

L. Acceptance: When materials or manufactured products comprise of such quantity that it is not practical to make physical tests or chemical analyses directly on the product furnished, a certificate stating the results of such tests or analyses of similar materials which were concurrently produced may, at the discretion of the Commissioner, be considered as the basis for the acceptance of such material or manufactured product.

M. Testing Compliance: The testing personnel must make the necessary inspections and tests, and the reports thereof must be in such form as will facilitate checking to determine compliance with the Specifications, indicating thereon all analyses and/or test data and interpreted results thereof.

N. Reports: Reports in duplicate must be submitted and authoritative certification thereof must be furnished to the Commissioner as a prerequisite for the acceptance of any material or equipment.

O. Rejections: If, in making any test, it is ascertained by the Commissioner that the material or equipment does not comply with the Specifications, the Contractor will be notified thereof, and will be directed to refrain from delivering said materials or equipment, or to promptly remove it from the site or from the Work and replace it with acceptable material at no additional cost to the City.

P. Furnish Designated Materials: Upon rejection of any material or equipment submitted as the equivalent of that specifically named in the Specifications, the Contractor must immediately proceed to furnish the designated material or equipment.

1.9 APPROVAL OF MATERIALS:

A. Local Laws: All materials, appliances and types or methods of construction must be in accordance with the Specifications and must in no event be less than that necessary to conform to the requirements of the New York City (NYC) Construction Codes, Administrative Code and Charter of the City of New York.

B. Approval of Manufacturer: The names of proposed manufacturers, material suppliers, and dealers who are to furnish materials, fixtures, equipment, appliances or other fittings must be submitted to the Commissioner for approval, as early as possible, to afford proper review and analysis. No manufacturer will be approved for any materials to be furnished under the Contract unless it has a plant of ample capacity and have successfully produced similar products. All approvals of materials or equipment that are legally required by the NYC Construction Codes and other governing authorities must be obtained prior to installation.

C. All Materials: Fixtures, fittings, supplies and equipment furnished under the Contract must be new and unused, except as approved by the Commissioner, and of standard first-grade quality and of the best workmanship and design. The City of New York encourages the use of recycled products where practical.

D. INFORMATION TO SUPPLIERS - In asking for prices on materials under any item of the Contract, the Contractor must provide the manufacturer or dealer with such complete information from the Specifications and Contract Drawings as may in any case be necessary, and in every case the Contractor must inform the manufacturer or dealer of all the General Conditions and requirements herein contained.

1.10 SPECIAL INSPECTIONS:

A. SPECIAL INSPECTIONS:

1. Inspection of selected materials, equipment, installation, fabrication, erection, or placement of components and connections made during the progress of the Work to ensure compliance with the Contract Documents and provisions of the NYC Construction Codes, will be made by a Special Inspector. The City of New York will retain the services of the Special Inspector and bear the costs for the performance of Special Inspections in compliance with NYC Construction Codes requirements or as additionally may be called for in the project specifications, except as noted below for Form TR-3: Technical Report for Concrete Design Mix. The Special Inspector will be an entity that is in compliance with the requirements of the NYC Construction Codes. The Contractor must notify the relevant Special Inspector in writing at least 72 hours before the commencement of any Work requiring special inspection.

2. Form TR3: Technical Report Concrete Design Mix: The Contractor will be responsible for, and bear all costs associated with the filing and securing of approvals, if any, for Form TR3: Technical Report Concrete Design Mix, including, but not limited to, engaging the services of a New York City licensed Concrete Testing Lab for the review and approval of concrete design mix, testing, signatures and professional seals, etc., compliant with NYC Department of Buildings requirements, for each concrete design mix.

3. The Contractor must notify the relevant Special Inspector in writing at least 72 hours before the commencement of any Work requiring Special Inspection. The Contractor will be responsible for and bear related costs to assure that all construction or work has suitable access and remains exposed for inspection purposes until the required inspection is completed.

4. Inspections and tests performed under "Special Inspection" will not relieve the Contractor of the responsibility to comply with the Contract Documents, and that there is no warranty given to the Contractor by the City of New York in connection with such inspection and tests or certifications made under "Special Inspections".

5. The Contractor must coordinate with the Commissioner to provide access and schedule the Work for inspection by the Special Inspector.

6. Any fabricators or off-site activities that require Special Inspection paid for by the City of New York must be within the continental United States, Canada, or Mexico, unless approved in writing by the Commissioner. If approval is granted, the Contractor will be responsible for the Special Inspector's travel costs.

1.11 INSPECTIONS BY OTHER CITY AGENCIES:

A. Letter of Completion: Just prior to Substantial Completion of the Project, the Commissioner will file with the Department of Buildings, an application for a Letter of Completion or a Certificate of Occupancy for the structure.

B. Final Inspections: In connection with the above-mentioned application for a Letter of Completion or a Certificate of Occupancy and before certificates of final payments are issued, the Contractor will be required to arrange for all final inspections by the inspection staff of the Department of Buildings, Fire Department, or other Governmental Agencies having jurisdiction, and secure all reports, sign offs, certificates, etc., by such inspection staff or other governmental agencies, in order that a Letter of Completion or Certificate of Occupancy can be issued promptly.

1.12 CERTIFICATES OF APPROVAL:

A. Responsibility: The Contractor will be responsible for and must obtain all final approvals for the Work installed under the Contract in the form of such certificates that are required by all governmental agencies having jurisdiction over the Work of the Contract.

B. Transmittal: All such certificates must be forwarded to the DDC.

1.13 ACCEPTANCE TESTS:

A. Government Agencies: All equipment and appliances furnished and installed under the Contract must conform to the requirements of the Specifications and will in no event be less than that necessary to comply with the minimum requirements of the law and all of the governmental agencies having jurisdiction.

B. Notice of Tests: Whenever the Specifications and/or any governmental agency having jurisdiction requires the acceptance test, the Contractor will give to all concerned, written notice of the time when these tests will be conducted.

C. Energy: The City will furnish all energy, fuel, water, and light required for tests.

D. Labor and Materials: The Contractor must furnish labor and all other material and instruments necessary to conduct the acceptance tests at no additional cost to the City.

E. Certificates: The Final Acceptance by the Commissioner will be contingent upon the Contractor delivering to the Commissioner all necessary certificates evidencing compliance in every respect with the requirements of the regulatory agencies having jurisdiction.

F. Results: If the results of tests and Special Inspections indicate that the material or procedures do not meet requirements as set forth on the Contract Drawings or in the Specifications or are otherwise unsatisfactory, the Contractor must only proceed as directed by the Commissioner. Additional costs resulting from retesting, re-inspecting, replacing of material and/or damage to the Work and any delay caused to the schedule will be borne by the Contractor.

PART II - PRODUCTS (Not Used)

PART III - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, the Contractor must repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

END OF SECTION 01 40 00

SECTION 01 42 00
REFERENCES

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 DEFINITIONS:

REFER TO THE ADDENDUM, Article IX, FOR ADDITIONAL DEFINITIONS AND REVISIONS TO THE CONTRACT AND SPECIFICATIONS

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

B. "APPROVED," ETC. - "Approved," "acceptable," "satisfactory," and words of similar import will mean and intend approved, acceptable, or satisfactory to the Commissioner.

C. Design Consultant: “Design Consultant” means the entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the “Design Consultant” may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

D. "DIRECTED," "REQUIRED," ETC.- Wherever reference is made in the Contract to the Work or its performance, the terms "directed," "required," "permitted," "ordered," "designated," "prescribed," "determined," and words of similar import will, unless expressed otherwise, imply the direction, requirements, permission, order, designation or prescription of the Commissioner.

E. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project Site is shown on Drawings.

1.3 CODES, AGENCIES AND REGULATIONS:

A.B.A	Architectural Barriers Act
A.D.A.A.G.	Americans with Disabilities Act (ADA) Accessibility Guidelines
B.G. & E.	Bureau of Gas and Electricity of the City of New York
B.S. A.	New York City Board of Standards and Appeals
DOE	Department of Energy
E.C.C.C.N.Y.S.	Energy Conservation Construction Code of New York State
EPA	Environmental Protection Administration
N.Y.C.C.C.	New York City Construction Codes
N.Y.C.P.C.	New York City Plumbing Code
N.Y.C.B.C.	New York City Building Code
N.Y.C.M.C.	New York City Mechanical Code New York
N.Y.C.F.G.C.	New York City Fuel Gas Code
N.Y.S. D.O.L	New York State Department of Labor
N.Y.C.D.O.B.	New York City Department of Buildings
N.Y.C.D.E.P.	New York City Department of Environmental Protection
N.Y.C.D.O.T.	New York City Department of Transportation
N.Y.C.E.C.	New York City Electrical Code
N.Y.C.E.C.C	New York City Energy Conservation Code
N.Y.C.F.C.	New York City Fire Code
N.Y.S...D.E.C.	New York State Department of Environmental Conservation
O.S.H.A.	Occupational Safety & Health Administration

1.4 INDUSTRY STANDARDS:

A. STANDARD REFERENCES – Unless otherwise specifically indicated in the Contract Documents, whenever reference is made to the furnishing of materials or testing thereof that conforms to the standards of any technical society, organization or body, it must be construed to mean the latest standard, code, specification adopted and published by that technical society, organization or body, as of the date of the bid opening, unless the provisions of the N.Y.C.C.C. adopts a different or earlier dated version of such standard. All references to the ICC A117.1 are only to the 2009 version, whether or not a specific version is specified.

B. APPLICABILITY OF STANDARDS: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect, to the extent referenced, as if bound or copied directly into the Contract Documents. Such standards are made a part of the Contract Documents by reference.

C. CONFLICTING REQUIREMENTS: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantity or quality, comply with the most stringent requirements. Immediately refer uncertainties and requirements that are different but apparently equal, to the Commissioner in writing for a decision before proceeding.

D. STANDARD SPECIFICATIONS - When no reference is made to a code, standard, or specification, the Standard Specifications of the ASTM or the AIEE, as the case may be, shall govern.

E. REFERENCES - Reference to a technical society, organization, or body may be made in the Specifications by abbreviations. Abbreviations and acronyms used in the Specifications and other Contract Documents mean the associated name. The following names are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the Issue Date of the Contract Documents.

AA	Aluminum Association, Inc. (The)
AAADM	American Association of Automatic Door Manufacturers
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AAPFCO	Association of American Plant Food Control Officials
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists (The)
ABAA	Air Barrier Association of America
ABMA	American Bearing Manufacturers Association
ACI	ACI International (American Concrete Institute)
ACAC	American Council for Accredited Certification
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies, Inc. (The)
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGC	Associated General Contractors of America (The)
AGMA	American Gear Manufacturer Association
AHA	American Hardboard Association (Now part of CPA)
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute

AIA	American Institute of Architects (The)
AIEE	American Institute of Electrical Engineers
AIHA	American Industrial Hygiene Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)
ALSC	American Lumber Standard Committee, Incorporated
ALI	Automotive Lift Institute
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts, Inc.
APA	APA - The Engineered Wood Association
APA	Architectural Precast Association
API	American Petroleum Institute
ARI	Air-Conditioning & Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASA	American Standards Association
ASAE	American Society of Agricultural Engineers
ASCE/SEI	American Society of Civil Engineers, Structural Engineering Institute
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASIS	American Society for Industrial Security
ASME	American Society of Mechanical Engineers

ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (Formerly: American Society for Testing and Materials)
AWCI	Association of the Wall and Ceiling Industry
AWCMA	American Window Covering Manufacturers Association (Now WCSC)
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWSC	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)
BICSI	Building Industry Consulting Services International
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)
BISSC	Baking Industry Sanitation Standards Committee
CDPH	California Department of Public Health
CIBSE	Charted Institute of Building Services Engineers
CCC	Carpet Cushion Council
CDA	Copper Development Association
CEA	Consumer Electronics Association
CESB	Council of Engineering and Scientific Specialty Boards
CFFA	Chemical Fabrics & Film Association, Inc.
CFSEI	Cold-Formed Steel Engineers Institute
CGA	Compressed Gas Association
CGSB	Canadian General Standards Board
CIMA	Cellulose Insulation Manufacturers Association

CIPRA	Cast Iron Pipe Research Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CPA	Composite Panel Association
CPPA	Corrugated Polyethylene Pipe Association
CPSC	Consumer Product Safety Commission
CRI	Carpet & Rug Institute (The)
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association
CSI	Cast Stone Institute
CSI	Construction Specifications Institute (The)
CSSA	Certified Steel Stud Association
CSSB	Cedar Shake & Shingle Bureau
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute)
DASMA	Door and Access Systems Manufacturer's Association International
DHI	Door and Hardware Institute
DOC	U.S. Department of Commerce – National Institute of Standards and Technology
EIA	Electronic Industries Alliance
DOJ	U.S. department of Justice
EIMA	EIFS Industry Members Association

DOL	U.S. Department of labor
EJCDC	Engineers Joint Contract Documents Committee
DOTn	U.S. Department of Transportation
EN	European Committee of Standards
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association
EVO	Efficiency Valuation Organization
FEMA	Federal Emergency Management Agency
FGIA	Fenestration and Glazing Industry Alliance
FIBA	Federation Internationale de Basketball Amateur (The International Basketball Federation)
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation)
FMG	FM Global (Formerly: FM - Factory Mutual System)
FMRC	Factory Mutual Research (Now FMG)
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
FSA	Fluid Sealing Association
FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GRI	(Now GSI)
GS	Green Seal
GSI	Geosynthetic Institute
HI	Hydraulic Institute
HI	Hydronics Institute

HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPVA	Hardwood Plywood & Veneer Association
HPW	H. P. White Laboratory, Inc.
HUD	U.S. Department of Housing and Urban Development
IAPMO	International Association of Plumbing and Mechanical Officials
IAS	International Approval Services (Now CSA International)
IBF	International Badminton Federation
ICC	International Code Council, Inc.
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGCC	Insulating Glass Certification Council
IGMA	Insulating Glass Manufacturers Alliance
IICRC	Institute of Inspection, Cleaning, and Restoration
ILIA	Indiana Limestone Institute of America, Inc.
IPEMA	International Play Equipment Manufacturers Association
ISA	International Society of Arboriculture
ISO	International Organization for Standardization
ISSFA	International Solid Surface Fabricators Association

ITS	Intertek
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association
LMA	Laminating Materials Association (Now part of CPA)
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association
MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association
MH	Material Handling (Now MHIA)
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MIL	Military Specification Standards of the US Dept of Defense
MPEG	Moving Picture Experts Group
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (National Association of Corrosion Engineers International)
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAIMA	North American Insulation Manufacturers Association
NBA	National Basketball Association
NBGQA	National Building Granite Quarries Association, Inc.
NCAA	National Collegiate Athletic Association (The)
NCMA	National Concrete Masonry Association

NCPI	National Clay Pipe Institute
NCTA	National Cable & Telecommunications Association
NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NETA	InterNational Electrical Testing Association
NFHS	National Federation of State High School Associations
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NICET	National Institute for Certification in Engineering Technologies
NLGA	National Lumber Grades Authority
NIS	National Institute of Standards and Technology
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)
NRCA	National Roofing Contractors Association
NRDCA	National Roof Deck Association
NRMCA	National Ready Mixed Concrete Association
NSI	Natural Stone Institute
NSF	NSF International (National Sanitation Foundation International)
NSSGA	National Stone, Sand & Gravel Association

NTMA	National Terrazzo & Mosaic Association, Inc. (The)
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)
NWWDA	National Wood Window and Door Association (Now WDMA)
OPL	Omega Point Laboratories, Inc. (Acquired by ITS - Intertek)
PCI	Precast / Pre-stressed Concrete Institute
PDCA	Painting & Decorating Contractors of America
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America)
PPS	Power Piping Society
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
RMI	Rack Manufacturers Institute
RTI	(Formerly: NTRMA - National Tile Roofing Manufacturers Association) (Now TRI)
RUS	Rural Utilities Service, Department of Agriculture
SAE	SAE International
SCAQMD	South Coast Air Quality Management District
SCS	Scientific Certification System
SDI	Steel Deck Institute
SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association

SGCC	Safety Glazing Certification Council
SHBI	Steel Heating Boiler Institute
SIA	Security Industry Association
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)
SFIA	Steel Framing Industry Association
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMPTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry
SSINA	Specialty Steel Industry of North America
SSMA	the Steel Stud Manufacturers Association
SSPC	SSPC: The Society for Protective Coatings
SSSA	Soil Science Society of America
STI	Steel Tank Institute
SWI	Steel Window Institute
SWRI	Sealant, Waterproofing, & Restoration Institute
TABB	Testing, Adjusting, and Balancing Bureau
TCA	Tile Council of America, Inc.
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance

TMS	The Masonry Society
TPI	Truss Plate Institute, Inc.
TPI	Turfgrass Producers International
TRI	Tile Roofing Institute (Formerly: RTI - Roof Tile Institute)
UL	Underwriters Laboratories Inc.
ULC	Underwriters Laboratories of Canada
UNI	Uni-Bell PVC Pipe Association
USAV	USA Volleyball
USC	United States Code
USGBC	U.S. Green Building Council
USITT	United States Institute for Theatre Technology, Inc.
WASTEC	Waste Equipment Technology Association
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association (Now WCSC)
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association)
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
WNBA	Women's National Basketball Association
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California)
WIC	Woodwork Institute of California (Now WI)
WMMPA	Wood Moulding & Millwork Producers Association
WRI	Wire Reinforcement Institute, Inc.
USEPA	United States Environmental Protection Agency

WSRCA	Western States Roofing Contractors Association
WWPA	Western Wood Products Association

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 50 00
TEMPORARY FACILITIES, SERVICES AND CONTROLS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes the following:
1. Temporary Water System
2. Temporary Sanitary Facilities
3. Temporary Electric Power, Temporary Lighting System, and Site Security Lighting
4. Temporary Heat
5. Dewatering Facilities and Drains
6. Temporary Field Office for Contractor
7. DDC Field Office
8. Material Sheds
9. Temporary Enclosures
10. Temporary Partitions
11. Temporary Fire Protection
12. Work Fence Enclosure
13. Rodent and Insect Control
14. Plant Pest Control Requirements
15. Project Identification Signage
16. Project Construction Sign and Rendering
17. Security Guards/Fire Guards on Site
18. Safety

1.3 RELATED SECTIONS: include without limitation the following:

A. Section 01 10 00 SUMMARY

B. Section 01 42 00 REFERENCES

C. Section 01 54 11 TEMPORARY ELEVATORS AND HOISTS

D. Section 01 54 23 TEMPORARY SCAFFOLDS AND SWING STAGING

E. Section 01 77 00 CLOSE OUT PROCEDURES

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	Definition
Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the Design Consultant may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
Permanent Enclosure	As determined by the Commissioner, permanent or temporary roofing that is complete, insulated, and weather tight; exterior walls which are insulated and weather tight; and all openings that are closed with permanent construction or substantial temporary closures.

1.5 SUBMITTALS:

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Reports: Submit reports of tests, inspections, meter readings and similar procedures for temporary use.

1.6 PROJECT CONDITIONS:

A. Temporary Use of Permanent Facilities and Services: The Contractor will be responsible for the operation, maintenance, and protection of each permanent facility and service during its use as a construction facility before Final Acceptance by the City, regardless of previously assigned responsibilities.

B. The Contractor must install, operate, maintain and protect temporary facilities, services, and controls, including without limitation:

1. Keep temporary services and facilities clean and neat in appearance;
2. Operate temporary services in a safe and efficient manner;
3. Relocate temporary services and facilities as needed as Work progresses;
4. Do not overload temporary services and facilities or permit them to interfere with progress;
5. Provide necessary fire prevention measures; and
6. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on-Site.

1.7 NON-REGULAR WORK HOURS (OVERTIME):

A. The Contractor must provide the temporary services, facilities and controls set forth in this section during non-regular working hours if the Contract Drawings and/or the Specifications indicate that the Work, or specific components thereof, must be performed during non-regular working hours. In such case, all costs for the provision of temporary services, facilities and controls during non-regular working hours will be deemed included in the total Contract price.

B. The Contractor must provide the temporary services, facilities and controls set forth in this section during non-regular working hours if a change order is issued directing the Contractor to perform the Work, or specific components thereof, during non-regular working hours. In such case, compensation for the provision of temporary services, facilities and controls during non-regular working hours will be provided

through the change order.

1.8 SERVICES BEYOND COMPLETION DATE:

A. The Contractor must provide the temporary services, facilities and controls set forth in this section until the date on which it completes all required Work at the Site, including all Final Approved Punch List Work, as certified in writing by the Resident Engineer, or earlier if so directed in writing by the Commissioner. The Contractor must provide such temporary services, facilities and controls even if completion of all required Work at the Site occurs after the time fixed for such completion in Schedule A.

PART II – PRODUCTS

2.1 MATERIALS:

A. The Contractor must provide undamaged materials in serviceable condition and suitable for use intended.

B. Tarpaulins: Waterproof, fire-resistant UL labeled with flame spread rating of fifteen (15) or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.

C. Water: Potable and in compliance with requirements of the New York City Department of Environmental Protection (DEP).

2.2 EQUIPMENT:

A. The Contractor must provide undamaged equipment in serviceable condition and suitable for use intended.

B. Water Hoses: Heavy-duty abrasive-resistant flexible rubber hoses, one hundred (100) feet (thirty (30) m) long with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.

C. Electric Power Cords: Grounded extension cords.

1. Provide hard-service cords where exposed to abrasion or traffic.
2. Provide waterproof connectors to connect separate lengths of electric cords where single lengths do not reach areas of construction Activity.
3. Do not exceed safe length-voltage ratio.

D. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART III –EXECUTION:

3.1 INSTALLATION, GENERAL:

A. The Contractor must locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. The Contractor must provide each facility ready for use when needed to avoid delay. The Contractor must not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities as approved by the Resident Engineer.

3.2 TEMPORARY WATER SYSTEM:

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.2 A

A. TEMPORARY WATER SYSTEM - NEW FACILITIES: During construction, the Contractor must furnish a Temporary Water System as set forth below.

1. Immediately after the Commissioner has issued an order to start the Work, the Contractor must file an application with DEP for the schedule of charges for water use during construction. The Contractor will be responsible for payment of water charges.

2. Immediately after the Commissioner has issued an order to start the Work, the Contractor must file an application with DEP's Bureau of Water Supply and obtain a permit to install the temporary water supply system. The system must be installed and maintained for the use of the Contractor and its Subcontractors. A copy of the above-mentioned permit must be filed with the Commissioner. The Contractor must provide temporary water main, risers and waste stacks as directed and install on each floor, outlets with two (2) 3/4" hose valve connections over a barrel installed on a steel pan. The Contractor must provide drains from the pans to the stack and house sewer and hose bibs to drain the water supply risers and mains. During winter months, the Contractor must take the necessary precautions to prevent the temporary water system from freezing. The Contractor must provide repairs to the temporary water supply system for the duration of the Project until said temporary system is dismantled and removed.

3. Disposition of Temporary Water System: The Contractor will be responsible for dismantling the temporary water system when no longer required for the construction operations, or when replaced by the permanent water system installed for the Project, or as otherwise directed by the Resident Engineer. All repair work resulting from the dismantling of the temporary water system will be the responsibility of the Contractor.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.2 B

B. TEMPORARY WATER SYSTEM – PROJECTS IN EXISTING FACILITIES:

1. When approved by the Commissioner, use of existing water system will be permitted for temporary water service during construction, as long as the system is cleaned and maintained in a condition acceptable to the Commissioner. At Substantial Completion, the Contractor must restore the existing water system to conditions existing before initial use.

2. The Contractor will be responsible for all repairs to the existing water system permitted to be used for temporary water service during construction. The Contractor will be responsible to maintain the existing system in a clean condition on a daily basis, acceptable to the Commissioner.

3. The Contractor will be responsible for payment of water charges as directed by the Commissioner. Billing will be in accordance with the New York City Water Board Water and Wastewater Rate Schedule.

C. WASH FACILITIES: The Contractor must install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition, including without limitation:

1. Dispose of drainage properly.

2. Supply cleaning compounds appropriate for each condition; and

3. Include safety showers, eyewash fountains and similar facilities for the convenience, safety and sanitation of personnel.

D. DRINKING WATER FACILITIES: The Contractor must provide drinking water fountains or containerized tap-dispenser bottled-drinking water units, complete with paper cup supplies. Where power is available, provide

electric water coolers to maintain dispensed water temperature at forty-five (45) to fifty-five (55) deg. F (7 to 13 deg. C).

3.3 TEMPORARY SANITARY FACILITIES:

A. The Contractor must provide toilets, wash facilities, and drinking water fixtures in compliance with regulations and health codes for type, number, location, operation and maintenance of fixtures and facilities. Provide toilet tissue, paper towels, paper cups and similar disposable materials as appropriate for each facility, and provide covered waste containers for used materials.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.3 B

B. SELF-CONTAINED TOILET UNITS:

1. The Contractor must provide temporary single-occupant toilet units of the chemical, aerated re-circulation, or combustion type for use by all construction personnel. Units must be properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material. Quantity of toilet units must comply with the latest Occupational Safety and Health Administration (OSHA) regulations.

2. Toilets: The Contractor must install separate, self-contained toilet units for male and female personnel. Shield toilets to ensure privacy.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.3 C

C. EXISTING TOILETS:

1. TOILET FACILITIES: When approved by the Commissioner, the Contractor must arrange for the use of existing toilet facilities by all personnel during the execution of the Work. The Contractor will be responsible to clean and maintain facilities in a condition acceptable to the Resident Engineer and, at Substantial Completion, to restore facilities to the condition at the time of initial use.

2. MAINTENANCE - The Contractor must maintain the temporary toilet facilities in a clean and sanitary manner and make all necessary repairs.

3. NUISANCES - The Contractor must not cause any sanitary nuisance to be committed by its employees or the employees of its Subcontractors in or about the Work and must enforce all sanitary regulations of the City and State Health Authorities.

3.4 TEMPORARY ELECTRIC POWER, TEMPORARY LIGHTING SYSTEM, AND SITE SECURITY LIGHTING:

A. SCOPE: This section sets forth the General Conditions and procedures relating to Temporary Electric Power, Temporary Lighting System, and Site Security Lighting during the construction period.

B. TEMPORARY ELECTRIC POWER: The Contractor must provide and maintain a temporary electric power service and distribution system of sufficient size, capacity and power characteristics required for construction operations for all required Work by the Contractor and its Subcontractors, including but not limited to, power for the temporary lighting system, site security lighting, construction equipment, hoists, temporary elevators and all field offices. temporary electric power must be provided as follows:

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 B (1)

1. CONNECTION TO UTILITY LINES:

a. Temporary electric power service for use during construction must be provided as follows: The Contractor must make all necessary arrangements with the public utility company and pay all charges for the Temporary Electric Power system. The Contractor must include in its total Contract price any charges for temporary electric power, including charges that may be made

by the public utility company for extending its electrical facilities, and for making final connections. The Contractor will make payment directly to the public utility company.

b. APPLICATIONS FOR METER: The Contractor must complete an application to the public utility company and sign all documents necessary for, and pay all charges incidental to, the installation of a watt hour meter or meters for Temporary Electric Power. The Contractor must pay to the public utility company all bills for temporary electric energy used throughout the Work as they become due.

c. SERVICE AND METERING EQUIPMENT: The Contractor must furnish and install, at a suitable location on the Site, approved service and metering equipment for the Temporary Electric Power System, ready for the installation of the public utility company's metering devices. The temporary service mains to and from the metering location must not be less than one hundred (100) Amperes, 3-phase, 4-wire and must be of sufficient capacity to take care of all demands for all construction operations and must meet all requirements of the New York City Electrical Code.

d. PAYMENT: See Sub-Section 3.4.F regarding payment for this scope of work.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 B (2)

2. CONNECTION TO EXISTING ELECTRICAL POWER SERVICE:

a. When approved by the Commissioner, electrical power service for the temporary lighting system and for the operation of small tools and equipment less than ¼ horsepower may be taken from the existing electric distribution system if the existing system is of adequate capacity for the temporary power load. The Contractor must cooperate and coordinate with the facility custodian, so as not to interfere with the normal operation of the facility.

b. There will be no charge to the Contractor for the electrical energy consumed.

c. The Contractor must provide, maintain and pay all costs for separate temporary electric power for any temporary power for equipment larger than 1/4 horsepower. When directed by the Commissioner, the Contractor must remove its own temporary power system.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 B (3)

3. ELECTRICAL GENERATOR POWER SERVICE:

a. When connection to utility lines or existing facility electric service is not available or is not adequate to supply the electric power need for construction operations, the Contractor must provide self-contained generators to provide power beyond that available.

b. Pay for all energy consumed in the progress of the Work, exclusive of that available from the existing facility or utility company.

c. Provide for control of noise from the generators.

d. Comply with the Ultra Low Sulfur Fuel in Non-Road Vehicles requirements as set forth in Article 5.4 of the Contract.

e. PAYMENT: See Sub-Section 3.4.F regarding payment for this scope of work.

C. USE OF COMPLETED PORTIONS OF THE ELECTRICAL WORK:

1. USE OF MAIN DISTRIBUTION PANEL: As soon as the permanent electric service feeders and equipment metering equipment and main distribution panel are installed and ready for operation, the Contractor must have the temporary lighting and power system changed over from the temporary service points to the main distribution panel.

2. COST OF CHANGE OVER: The Contractor will be responsible for all costs due to this change over of service and it must also make application to the public utility company for a watt hour meter to be set on the permanent meter equipment.

3. The requirements for temporary electric power service specified herein must be adhered to after change over of service until Final Acceptance of the Project.

4. NO EXTRA COST: The operation of the service and switchboard equipment will be under the supervision of the Contractor, but this will in no way be interpreted to mean the acceptance of such part of the installation or relieve the Contractor from its responsibility for the complete Work or any part thereof. There will be no additional charge for supervision by the Contractor.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 D

D. TEMPORARY LIGHTING SYSTEM:

1. The Contractor must provide adequate service for the temporary lighting system, or a minimum of one hundred (100) Amperes, 3-phase, 4-wire service for the temporary lighting system, whichever is greater, and make all necessary arrangements with the public utility company and pay all charges by them for the Temporary Lighting System.

2. The Contractor must furnish and connect to the metered service point a Temporary Lighting System to illuminate the entire area where Work is being performed and points adjacent to the Work, with separately fused circuits for stairways and bridges. Control switches for stairway circuits must be located near entrance on ground floor.

3. ITEMS: The Temporary Lighting System provided by the Contractor must consist of wiring, fixtures, left-hand double sockets (one (1) double socket for every 400 square feet, with one (1) lamp and one (1) three-prong outlet), lamps, fuses, locked-type guards, pigtails and any other incidental material. Additional details may be outlined in the detailed Specifications for the electrical Work. Changes may be made, provided the full equivalent of those requirements is maintained.

4. The Temporary Lighting System will be progressively installed as required for the advancement of the Work under the Contract.

5. RELOCATION: The cost for the relocation or extension of the original Temporary Lighting System, as required by the Contractor or its Subcontractors, that is not required due to the normal advancement of the Work, as determined by the Resident Engineer, will be borne by the Contractor.

6. PIGTAILS: The Contractor must furnish pigtails with left-hand sockets with locked-type guards and forty (40) feet of rubber covered cable. The Contractor must furnish and distribute a minimum of three (3) complete pigtails to each Subcontractor. See the detailed Electrical Specifications for possible additional pigtails required.

7. LAMPS: The Contractor must furnish and install one (1) complete set of lamps, including those for the trailers. Broken and burned out lamps in the temporary lighting system, DDC field office, and construction trailers must be replaced by the Contractor. All lamps must be compact fluorescent.

8. CIRCUIT PROTECTION: The Contractor must furnish and install Ground Fault Interruption (GFI) protection for the temporary lighting and site security lighting systems.

9. MAINTENANCE OF TEMPORARY LIGHTING SYSTEM:

   a. The Contractor must maintain the Temporary Lighting System in good working order during the scheduled hours established.

   b. The Contractor must include in its total Contract price all costs in connection with the Temporary Lighting System, including all costs for installation, maintenance and electric power.

10. REMOVAL OF TEMPORARY LIGHTING SYSTEM: The temporary lighting system must be removed by the Contractor when authorized by the Commissioner.

11. HAND TOOLS: The temporary lighting system must not be used for power purposes, except that light hand tools not larger than 1/4 horsepower may be operated from such system by the Contractor and its Subcontractors.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4 E

E. SITE SECURITY LIGHTING (NEW CONSTRUCTION ONLY):

1. The Contractor must furnish, install and maintain a system of site security lighting, as herein specified, to illuminate the construction Site of the Project, with the system connected to and energized from the Temporary Lighting System. All costs in connection with site security lighting will be deemed included in the total Contract price.

2. It is essential that the site security lighting system be completely installed and operating at the earliest possible date. The Contractor must direct its Subcontractors to cooperate, coordinate and exert every effort to accomplish an early complete installation of the site security lighting system. If, after the system is installed and in operation, a part of the system interferes with the Work of any trade, the Contractor will be completely responsible for the expense of removing, relocating, and replacing all equipment necessary to reinstate the system to proper operating conditions.

3. The system must consist of flood lighting by pole-mounted guarded sealed-beam units. Floodlight units must be mounted sixteen (16) feet above grade. Floodlights must be spaced around the perimeter of the Site to produce an illumination level of no less than one (1) foot candle around the perimeter of the Site, as well as in any potentially hazardous area or any other area within the Site that might be deemed by the Resident Engineer to require security illumination. The system must be installed in a manner acceptable to the Resident Engineer. The first lighting unit in each circuit must be provided with a photoelectric cell for automatic control. The photoelectric cell must be installed as per manufacturer's recommendations.

4. All necessary poles must be furnished and installed by the Contractor.

5. The site security lighting must be kept illuminated at all times during the hours of darkness. The Contractor must, at its own expense, keep the system in operation and must furnish and install all material necessary to replace all damaged or burned out parts.

6. The Contractor must be on telephone call alert for maintaining the system during the operating period stated above.

7. All materials and equipment furnished under this section will remain the property of the Contractor and must be removed and disposed of by the Contractor when authorized in writing by the Resident Engineer.

F. PAYMENT FOR TEMPORARY ELECTRICAL

1. The following temporary Electrical scope will be paid for on unit price basis:

   a. Temporary Electric power where the Contractor pays for the utility costs (subsection 3.4.B.1)

   b. Temporary Electric power where the Contractor provides generator service (subsection 3.4.B.3)

2. All temporary electrical scope described in Subsection 3.4 except as noted above in 3.4.F.1 must be included in the Contractor’s lump sum price.

3. For the temporary electric power that will be paid for by unit price:

a. The quantity to be measured for payment under this item will be the number of months (to the nearest 1/4 month increment) that the Contractor satisfactorily provides for temporary electric power in accordance with these General Conditions.

b. The unit price bid per month for temporary electric power must include the cost of furnishing all labor, materials, plant, equipment, insurance, and incidentals required to provide temporary electric power, all in accordance with the Contract Drawings, these specifications, and the directions of the Commissioner.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.5

3.5 TEMPORARY HEAT:

A. GENERAL:

1. Definition: The provision of Temporary Heat means the provision of heat in order to permit construction to be performed in accordance with the Progress Schedule during all seasons of the year and to protect the Work from the harmful effects of low temperature. In the event the building, or any portion thereof, is occupied during construction, the provision of Temporary Heat will include the provision of heat to permit normal operations in such occupied areas.

   a. The provision of Temporary Heat must be in accordance with the temperature requirements set forth in sub-section 3.5 C herein.

   b. The provision of Temporary Heat must include the provision of: 1) all fuel necessary and required, 2) all equipment necessary and required, and 3) all operating labor necessary and required. Operating labor must mean that minimum force required for the safe day-to-day operation of the system for the provision of Temporary Heat and must include, without limitation, heating maintenance labor and/or fire watch as required by New York City Fire Department (FDNY) regulations. Operating labor may be required seven (7) days per week and during non-regular working hours, for the period of time required by seasonal weather conditions.

   c. In the event the building, or any portion thereof, is occupied and the Project involves the replacement, modification, and/or shut down of the permanent heating system, or any key component thereof, and such system is a combined system which furnishes domestic hot water for the building occupants, the provision of Temporary Heat must include the provision of domestic hot water at the same temperature as the system which is being replaced. Domestic hot water must be provided in accordance with the phasing requirements set forth in the Contract Documents.

2. Responsibility: The Contractor's responsibility for the provision of Temporary Heat, including all expenses in connection therewith, is as set forth below:

   a. Projects involving enclosure of the building:

      i. Prior to Enclosure: Until the Commissioner determines that the building has been enclosed, as set forth in sub-section 3.5 B, the Contractor is responsible for the provision of Temporary Heat.

      ii. Post Enclosure: Once the Commissioner determines that the building, or any portion thereof, has been enclosed, as set forth in sub-section 3.5 B, the Contractor is responsible for the provision of Temporary Heat by one or more of the following means: 1) by an existing heating system (if any), 2) by a permanent heating system which is being installed as part of the Project, or 3) by a temporary heating system(s).

      iii. The Contractor must, within two (2) weeks of the kick-off meeting, submit to DDC for review its proposed plan to provide Temporary Heat. Such plan is subject to approval

by the Resident Engineer. The Contractor must provide Temporary Heat in accordance with the approved plan until written acceptance by the Commissioner of the Work of all Subcontractors, including punch list Work, unless directed otherwise in writing by the Commissioner. The responsibility of the Contractor provided for herein is subject to the exception set forth in sub-section 3.5 A.2 (b) herein.

b. Projects not involving enclosure of the building:

i. If the Project involves the installation of a new permanent heating system if one did not exist previously, or the replacement, modification, and/or shut down of the existing permanent heating system, or any key component thereof, the Contractor will be responsible for the provision of Temporary Heat, except as otherwise provided in sub-section 3.5 H.3(b).2 herein.

ii. If the Project does not involve the installation of a new permanent heating system if one did not exist previously, or the replacement, modification, and/or shut down of the existing permanent heating system, or any key component thereof, there is no Contractor responsibility of the provision of Temporary Heat, unless otherwise specified in the Contract Documents. However, if the Commissioner, pursuant to sub-section 3.5 H.3 (b).1 herein, determines that the provision of Temporary Heat is necessary due to special and/or unforeseen circumstances, the Contractor will be responsible for the provision of Temporary Heat and must be paid for the same in accordance with sub-section 3.5 H.3 (b).1 herein.

B. ENCLOSURE OF STRUCTURES:

1. Notification: The Contractor must notify all of its Subcontractors and the Resident Engineer at least thirty (30) Days prior to the anticipated date that the building(s) will be enclosed.

2. Commissioner Determination: The Commissioner will determine whether the building, or any portion thereof, has been enclosed. As indicated in sub-section 3.5 A.2 above, once the building has been enclosed, the Contractor will be responsible for the provision of Temporary Heat. The Commissioner's determination with respect to building enclosure will be based upon all relevant facts and circumstances, including without limitation, 1) whether the building meets the criteria set forth in Paragraph 3 below, and 2) whether the openings in the building, such as doorways and windows, have been sufficiently covered so as to provide reasonable heat retention and protection from the elements.

3. Criteria for enclosure:

a. Roof Area:

i. A building will be considered to be roofed when the area to be roofed is covered by a permanent structure and all openings through the permanent structure are covered and protected by temporary covers as described in Paragraph (c) below.

ii. Intermediate floor structures of multi-floor buildings will be considered to be roofed subject to the same requirements of the building roof.

iii. The final roofing system need not be in place for the building or structure to be determined to be enclosed, provided, however, all openings through the permanent structure covering the roof must be covered and protected by temporary covers, as described in Paragraph (c) below.

b. Walls: For the walls to be determined to be enclosed, permanent exterior wall elements or facing material must be in place and all openings must be covered and protected by temporary covers, as described in Paragraph (c) below.

c. Temporary Covers: In order to be acceptable, temporary covers must be securely fixed to prevent the entrance of rain, snow and direct wind. The minimum material requirements for temporary covers are as follows: 1) minimum ten (10) millimeter plastic, 2) minimum twelve (12) ounce waterproof canvas tarpaulins, or 3) a minimum three-eighths (3/8) inch thickness exterior grade plywood.

d. Temporary covers for openings will be the responsibility of the Contractor and such Work will be deemed included in the Contract price.

C. TEMPERATURE REQUIREMENTS:

1. Unoccupied Buildings: The temperature requirement for the provision of Temporary Heat in unoccupied buildings will be the GREATER of the following: 1) fifty (50) degrees Fahrenheit, or 2) the temperature requirement for the particular type of Work set forth in the Contract Documents.

2. Occupied Buildings: The temperature requirement for the provision of Temporary Heat in occupied buildings, or portions thereof, will be the GREATER of the following: 1) sixty-eight (68) degrees Fahrenheit, or 2) the temperature requirement for the particular type of Work set forth in the Contract Documents.

D. DURATION:

1. The Contractor is required to provide Temporary Heat until Final Acceptance, including all punch list work, as certified in writing by the Resident Engineer, or earlier if so directed in writing by the Commissioner. The Contractor is responsible for the provision of Temporary Heat for the time specified herein, regardless of any delays in completion of the Project, including delays that result in the commencement of the provision of Temporary Heat during a season that is later than that which may have been originally anticipated. Payment for temporary heat will be made on a unit price basis in accordance with Sub-Section 3.5.K.

E. METHOD OF TEMPORARY HEAT:

1. The method of temporary heat must be in conformance with the New York City Fire Code and with all applicable laws, rules, and regulations. Prior to implementation, such method must be subject to the written approval of the Commissioner.

2. The method of temporary heat must:

a. Not cause the deposition of dirt or smudges upon any finished Work or cause any defacement or discoloration to the finished Work.

b. Not be injurious or harmful to people or materials.

c. Portable fueled heating devises or equipment will NOT be allowed for use as temporary heat other than construction-related curing or drying in conformance with the NYC Fire Code.

3. No open fires will be permitted.

F. TEMPORARY HEATING SYSTEM:

1. The temporary system for the provision of Temporary Heat provided by the Contractor following enclosure of the building must be complete, including, subject to provisions of paragraph E above, boilers pumps, radiators, space heaters, water and heating piping, insulation and controls. The temporary system for the provision of Temporary Heat must be capable of maintaining the minimum temperature requirements set forth in Paragraph C above.

G. COORDINATION:

1. The Contractor, in the provision of Temporary Heat, must coordinate its operations in order to insure sufficient and timely performance of all required Work, including Work performed by trade Subcontractors. The Contractor must supply and pay for all water required and used in the building

for the operation of the heating system(s) for the purpose of Temporary Heat. The Contractor must include all expenses in connection with the supply of water for Temporary Heat in its total Contract price. During the period in which Temporary Heat in an enclosed building is being furnished and maintained, the Contractor must provide proper ventilating and drying, open and close the windows and other openings when necessary for the proper execution of the Work and when directed by DDC. The Contractor must maintain all permanent or temporary enclosures at its own expense.

H. USE OF PERMANENT HEATING SYSTEMS:

1. Use of Permanent Heating System for Temporary Heat after Building Enclosure:

a. The Contractor must provide all labor and materials to promptly furnish and set all required equipment, convectors and/or radiators, piping, valves, fitting, etc., in ample time for their use for the provision of Temporary Heat after enclosure of the building.

b. New portions of the permanent heating system that are used for furnishing Temporary Heat must be left in near-perfect condition when delivered to the City for operation. Any repairs required, other than for ordinary wear and tear on the equipment, must be made by the Contractor at his/her expense. The starting date for the warranty or guarantee period for such equipment must be the date of Substantial Completion acceptance.

c. In the event that the Contractor does not advance the installation of the permanent heating system in sufficient time to permit its use for Temporary Heat as determined by DDC, the Contractor must furnish and install a separate system for the provision of Temporary Heat as required to maintain the minimum temperature requirements set forth in Paragraph C above.

2. All equipment for the system for the provision of Temporary Heat must be placed so as to comply with the requirements specified hereinbefore, and must be connected, disconnected and suitably supported and located so as to permit construction Work, including finish Work such as wall plastering and painting, to proceed. The installation of the system for the provision of Temporary Heat by the Contractor, including the placing of ancillary system equipment, must be coordinated with the operations of all trade Subcontractors so as to insure sufficient and timely performance of the Work. Once the permanent heating system is operating properly, the Contractor must remove all portions of the system for Temporary Heat not part of the permanent heating system.

I. RELATED ELECTRICAL WORK:

1. The Contractor must be responsible for providing the items set forth below and must include all expenses in connection with such items in its total Contract price. The Contractor must provide such items promptly when required and must in all respects coordinate its Work with the Work performed by trade Subcontractors in order to facilitate the provision of Temporary Heat.

a. The Contractor must provide all labor, materials, equipment and power necessary and required to furnish and maintain any temporary or permanent electrical connections to all equipment specified to be connected as part of the work of the Contractor's Contract.

b. The Contractor must supply and pay for all power necessary and required for the operation of the system for the provision of Temporary Heat and/or the permanent heating system used for Temporary Heat. Such power must be provided by the Contractor for the duration the Contractor is required to provide Temporary Heat, as set forth in sub-section 3.5 D herein.

2. In providing the items set forth in Paragraph 1 above, the Contractor is advised that labor may be required seven (7) days a week and/or during non-regular working hours for the period of time required by seasonal weather conditions.

J. RELATED PLUMBING WORK:

1. The Contractor must be responsible for providing all labor, materials, and equipment necessary and required to furnish and maintain all temporary or permanent connections to all equipment or plumbing

outlets specified to be provided as part of the Work of this Contract. The Contractor must include all expenses in connection with such items of Work in its total Contract price. The Contractor must provide such items of Work promptly when required and must in all respects coordinate its Work with the Work performed by trade Subcontractors in order to facilitate the provision of Temporary Heat.

2. In the event portions of the permanent plumbing equipment furnished by the Contractor as part of the Work of this Contract are used for the provision of Temporary Heat either during construction or prior to acceptance by the City of the complete plumbing system, the Contractor will be responsible to provide such plumbing equipment to the City in near-perfect condition and must make any repairs required, other than for ordinary wear and tear on the equipment, at the Contractor's expense. The starting date for warranty and/or guarantee period for such plumbing equipment must be the date of Substantial Completion by the City.

3. For Projects requiring the installation of new and/or modified gas service, as well as associated meter installations, the Contractor must promptly perform all required filings and coordination with the utility companies in order to expedite the installation, testing, and approval of the gas service and associated meter(s).

K. PAYMENT FOR TEMPORARY HEAT

1. Payment for temporary heat will be made on a unit price basis.

2. The quantity to be measured for payment under this item will be the number of months (to the nearest 1/4 month increment) that the Contractor satisfactorily provides for temporary heat in accordance with these specifications.

3. The unit price bid per month for temporary heat must include the cost of furnishing all labor, materials, plant, equipment, insurance, and incidentals required to provide temporary heat, all in accordance with the Contract Drawings, these specifications, and the directions of the Commissioner. When directed in writing by the Commissioner, temporary heat will be provided and paid for a period of time beyond 6 months past the Substantial Completion date. Payment for each month's temporary heat after the date of Substantial Completion acceptance will be made as part of the final payment.

3.6 STORM WATER CONTROL, DEWATERING FACILITIES AND DRAINS:

A. PUMPING:

1. Comply with requirements of authorities having jurisdiction. Maintain Project Site, excavations, and construction free of water. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of storm water from heavy rainfall.

2. Contractor must furnish and install all necessary automatically operated pumps of adequate capacity with all required piping to run-off agencies, so as to maintain the excavation, cellar floor, pits and exterior depressions and excavations free from accumulated water during the entire period of construction and up to the date of Final Acceptance of Work of the Contract.

3. All pumps must be maintained at all times in proper working order.

4. Dispose of rainwater in a lawful manner that will not result in flooding the Project or adjoining properties nor endanger permanent Work or temporary facilities.

5. Remove snow and ice as required to minimize accumulations.

3.7 TEMPORARY FIELD OFFICE FOR CONTRACTOR:

A. The Contractor must establish a temporary field office for its own use at the Site during the period of construction, at which readily available copies of all Contract Documents must be kept.

B. The field office must be located where it will not interfere with the progress of any part of the Work or with visibility of traffic control devices.

C. CONTRACTOR'S REPRESENTATIVE: There must be a responsible and competent representative of the Contractor in charge of the office who is duly authorized to receive orders and directions and to put them into effect.

D. Arrangements must be made by the Contractor whereby its representative may be readily available by telephone.

E. All temporary structures must be of substantial construction and neat appearance, and must be painted a uniform gray unless otherwise directed by the Commissioner.

F. CONTRACTOR'S SIGN: The Contractor must post and keep posted on the outside of its field office, office, exterior fence, or wall at Site of Work, a legible sign giving the full name of the company, address of the company and telephone number(s) of responsible representative(s) of the firm who can be reached in the event of an emergency at any time.

G. ADVERTISING PRIVILEGES: The City reserves the right to all advertising privileges. The Contractor must not cause any signs of any kind to be displayed at the Site unless specifically required herein or authorized by the Commissioner.

3.8 DDC FIELD OFFICE:

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8 A

A. OFFICE SPACE IN EXISTING BUILDING:

1. The Resident Engineer will arrange for office space for sole use in the building where Work is in progress. The Contractor must provide and install a lockset for the door to secure the equipment in the room. The Contractor must provide two (2) keys to the Resident Engineer. After completion of the Project the Contractor must replace the original lockset on the door and ensure its proper operation.

2. In addition to equipment specified in sub-section 3.8 D, the Contractor must provide, for exclusive use of the DDC Field Office, the following:

   a. Two (2) single pedestal desks, 42” x 32”; two (2) swivel chairs with arms and three (3) side chairs without arms to match desk. Two metal (2) lockers, single units, 15” x 18” x 78” overall including 6” legs. Lockers to have flat key locks with two (2) keys each, General Steel products or approved equal. Two (2) full ball bearing suspension four (4) drawer vertical legal filing cabinets with locks, approximately 52”H x 28 ½”D x 18”W.

   b. One (1) 9000 B.T.U air conditioner or as directed by Commissioner. Wiring for the air conditioner must be minimum No. 12 AWG fed from individual circuits in the fuse box.

   c. One (1) folding conference table, 96” x 30” and ten (10) folding chairs.

   d. Two (2) metal wastebaskets.

   e. One (1) fire extinguisher, one (1) quart vaporizing liquid type, brass, wall mounted by Pyrene No. C21 or approved equal.

   f. One (1) Crystal Springs water cooler with bottled water, Model No. LP14058 or approved equal to be furnished for the duration of the Project as required.

3. The Contractor must provide one (1) telephone, where directed and must pay all costs for telephone service for calls within the New York City limits for the duration of the Project.

4. All furniture and equipment, except computer equipment specified in sub-section 3.8 D.3, must

remain the property of the Contractor.

5. Computer workstation quantities must be provided as specified in sub-section 3.8 B 3-a for DDC Managed Projects, or sub-section 3.8 B 3-b for CM Managed Projects.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8 B

B. DDC FIELD OFFICE TRAILER:

1. GENERAL: The Contractor must, for the time frame specified herein, provide and maintain at its own cost and expense a DDC Construction Field Office and all related items as specified herein [hereinafter collectively referred to as the "DDC Field Office"] for the exclusive use of the Resident Engineer. The DDC Field Office must be located at the Project Site and must be solely dedicated to the Project. Provision of the DDC Field Office must commence within thirty (30) Days from Notice to Proceed (NTP) and must continue through forty-five (45) Days after Substantial Completion of the required construction at the Project Site. The Contractor must remove the DDC Field Office forty-five (45) Days after Substantial Completion of the required construction, or as otherwise directed in writing by the Commissioner.

2. TRAILER: The Contractor must provide at its own cost and expense a mobile office trailer for use as the DDC Field Office. The Contractor must install and connect all utility services to the trailer within thirty (30) Days from NTP. The trailer must have equipment in compliance with the minimum requirements hereinafter specified. Any permits and fees required for the installation and use of said trailer must be borne by the Contractor. The trailer including furniture and equipment therein, except computer equipment specified in sub-section 3.8D.3 herein, must remain the property of the Contractor.

3. Trailer must be an office-type trailer of the size specified herein, with exterior stairs at entrance. Trailer construction must be minimum 2 x 4 wall construction fully insulated with paneled interior walls, pre-finished gypsum board ceilings and vinyl tile floors.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8.B.3a or SUB-SECTION 3.8.B.3b.

a. <u>DDC Managed Project Trailer</u>: DDC Field Office Trailer Size, Layout and Computer Workstation:

1) Overall length: 32 Feet
Overall width: 10 Feet

2) Interior Layout:
Provide one (1) general office/conference room area and one (1) private office at one end of the trailer. Provide equipment and amenities as specified in sub-section 3.8.B herein.

iii. Computer Workstation: Provide one (1) complete computer workstation and one (1) tablet, as specified in sub-section 3.8.D herein, in the private office area as directed by the Resident Engineer.

b. <u>CM Managed Project Trailer</u>: DDC Field Office Trailer Size, Layout and Computer Workstation:

1) Overall length: 50 Feet
Overall width: 10 Feet

2) Interior Layout:

Provide one (1) large general office/conference room in the center of the

trailer and two (2) private offices, one (1) each at either end of the trailer. Provide equipment and amenities as specified in sub-section 3.8.B herein.

3) Computer Workstation:

Provide three (3) complete computer workstations and two (2) tablets as specified in sub-section 3.8.D herein. Provide one (1) each complete computer workstation in each private office and one (1) complete computer workstation at the secretarial position as directed by the Resident Engineer.

4. The exterior of the trailer must be lettered with black block lettering of the following heights with white borders:

CITY OF NEW YORK	2-1/2"
DEPARTMENT OF DESIGN AND CONSTRUCTION	3-3/4"
DIVISION OF PUBLIC BUILDINGS	3-1/2"
DDC FIELD OFFICE	2-1/2"

NOTE: In lieu of painting letters on the trailer, the Contractor may substitute a sign constructed of a good quality weatherproof material with the same type and size of lettering above.

5. All windows and doors must have aluminum insect screens. Provide wire mesh protective guards at all windows.

6. The interior must be divided by partitions into general and private office areas as specified herein. Provide a washroom located adjacent to the private office and a built-in wardrobe closet opposite the washroom. Provide a built-in desk in the private office(s) with fixed overhead shelf and clearance below for two (2) file cabinets.

7. Provide a built-in drafting or reference table, located in the general office/conference room, at least sixty (60) inches long by thirty-six (36) inches wide with cabinet below and wall type plan rack at least forty-two (42) inches wide.

8. The washroom must be equipped with a flush toilet, wash basin with two (2) faucets, medicine cabinet, complete with supplies and a toilet roll tissue holder. Plumbing and fixtures must be approved house type, with each appliance trapped and vented and a single discharge connection. Five (5) gallon capacity automatic electric heater for domestic hot water must be furnished.

9. HVAC: The trailer must be equipped with central heating and cooling adequate to maintain a temperature of seventy-two (72) degrees during the heating season and seventy-five (75) degrees during the cooling season when the outside temperature is five (5) degrees F. winter and eighty-nine (89) degrees F. summer.

10. Interior lighting must be provided via ceiling mounted fluorescent lighting fixtures to a minimum level of fifty (50) foot candles in the open and private office(s) along with sufficient lighting in the washroom. Broken and burned out lamps must be replaced by the Contractor. A minimum of four (4) duplex convenience outlets must be provided in the open office and two (2) each in the private office(s). These outlets must be in addition to special outlet requirements for computer stations, copiers, HVAC unit, etc. Exterior lighting must be provided for the security of staff and visitors, with lighting provided at all entrances and as directed by the Commissioner.

11. Electrical service switch and panel must be adequately sized for the entire trailer load. Provide dedicated circuits for HVAC units, hot water heater, copiers and other equipment as required. All wiring and installation must conform to the New York City Electrical Code.

12. The following movable equipment must be furnished:

a. Two (2) single pedestal desks, 42" x 32"; two (2) swivel chairs with arms and three (3) side chairs without arms to match desk. Two (2) full ball bearing suspension four (4) drawer

vertical legal filing cabinets with locks and two (2) full ball bearing two (2) drawer vertical legal filing cabinets in each private office located below built-in desk.

b. One (1) folding conference table, 96” x 30” and ten (10) folding chairs.

c. Three (3) metal wastebaskets.

d. One (1) fire extinguisher one (1) quart vaporizing liquid type, brass, wall mounted by Pyrene No. C21 or approved equal.

e. One (1) Crystal Springs water cooler with bottled water, Model No. LP14058 or approved equal to be furnished for the duration of the Contract as required.

13. TRAILER TEMPORARY SERVICE: Plumbing and electrical Work required for the trailer will be furnished and maintained as below.

a. PLUMBING WORK: The Contractor must provide temporary water and drainage service connections to the DDC Field Office trailer for a complete installation. Provide all necessary soil, waste, vent and drainage piping.

Contractor to frost-proof all water pipes to prevent freezing.

1) REPAIRS, MAINTENANCE: The Contractor must provide repairs for the duration of the Project until the trailer is removed from the Site.

2) DISPOSITION OF PLUMBING WORK: At the expiration of the time limit set forth in sub-section 3.8 B 1 herein, the temporary water and drainage connections and piping to the DDC Field Office trailer must be removed by the Contractor and must be plugged at the mains. All piping must become the property of the Contractor for plumbing Work and must be removed from the Site, all as directed. All repair Work due to these removals must be the responsibility of the Contractor.

b. ELECTRICAL WORK:

1) The Contractor must furnish, install and maintain a temporary electric feeder to the DDC Field Office trailer immediately after it is placed at the job Site.

2) The temporary electrical feeder and service switch/fuse must be adequately sized based on the trailer load and installed per the New York City Electrical Code and complying with utility requirements.

3) Make all arrangements and pay all costs to provide electric service.

4) The Contractor must pay all costs for current consumed and for maintenance of the system in operating condition, including the furnishing of the necessary bulb replacements lamps, etc., for the duration of the Project and for a period of forty-five (45) Days after the date of Substantial Completion.

5) Disposition of Electric Work: At the expiration of the time limit set forth, the temporary feeder, safety switch, etc., must be removed and disposed of as directed.

6) All repair Work due to these removals must be the responsibility of the Contractor.

c. MAINTENANCE:

1) The Contractor must provide and pay all costs for regular weekly janitor service and furnish toilet paper, sanitary seat covers, cloth towels and soap and maintain the DDC Field Office in first-class condition, including all repairs, until the trailer is removed from the Site.

2) Supplies: The Contractor must be responsible for providing (1) all office supplies, including without limitation, pens, pencils, stationery, filtered drinking water and sanitary

supplies, and (2) all supplies in connection with required computers and printers, including without limitation, an adequate supply of blank CD's/DVD's, storage boxes for blank CDs/DVDs, and paper and toner cartridges for the printer.

3) Risk of Loss: The entire risk of loss with respect to the DDC Field Office and equipment must remain solely and completely with the Contractor. The Contractor must be responsible for the cost of any insurance coverage determined by the Contractor to be necessary for the field office.

4) At forty-five (45) Days after the date of Substantial Completion, or sooner as directed by the Commissioner, the Contractors must have all services disconnected and capped to the satisfaction of the Commissioner. All repair Work due to these removals must be the responsibility of the Contractor.

d. TELEPHONE SERVICE: The Contractor must provide and pay all costs for the following telephone services for the DDC Field Office trailer:

1) Separate telephone lines for one (1) desk phone in each private office.

2) One (1) wall phone (with six (6) foot extension cord) at plan table.

3) Telephone and internet access in each private office. Telephone service must include voice mail. All electronic voicemail messages must be automatically forwarded as email attachments, to allow for the voicemails to be played remotely.

4) A remote bell located on outside of trailer.

5) The telephone service must continue until the trailer is removed from the Site.

e. SECURITY CAMERAS: Wi-Fi enabled security cameras must be provided at all entrances and exits, except for fire escapes / emergency stairwells, which do not require cameras. One security camera must be provided for the interior of the DDC Field Office, with the location to be determined by the Commissioner. Cameras must be minimum 1080p video resolution. Cameras must have internet cloud storage, with all videos stored for a minimum of two weeks. The cloud storage must be accessible via desktop or mobile. Cameras may be hardwired for power or battery powered; battery powered cameras must have the batteries changed by the Contractor as required to ensure no lapses of service. Signs must be posted indicating that the area is under video surveillance.

f. PERMITS: The Contractor must make the necessary arrangements and obtain all permits and pay all fees required for this Work.

C. RENTED SPACE: The Contractor has the option of providing, at its cost and expense, rented office or store space in lieu of trailer. Said space must be in the immediate area of the Project and have adequate plumbing, heating and electrical facilities. Space chosen by the Contractor for the DDC Field Office must be approved by the Commissioner before the area is rented. All insurance, maintenance and equipment, including computer workstations and security cameras specified in sub-section 3.8 D in quantities required as specified in sub-section 3.8 B 3 for the DDC Field Office trailer, must also apply to rented spaces.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.8 D

D. ADDITIONAL EQUIPMENT FOR THE DDC FIELD OFFICE:

1. Photocopying Machine: Stand-alone, heavy duty, electric, dry-process color photocopying type with color scan and send capability via email, a minimum production rate of seventy (70) pages per minute and an adequate supply of copy paper, toner, etc. The machine must be capable of duplex copying paper sizes of 8-1/2 x 11 inches, 8-1/2 x 14 inches and 11 x 17 inches, and have separate trays for each paper size. It must have a document feeder, collator, stapler, and the capability to reduce/enlarge copies between each paper size. The supply of each size copy paper, toner, etc.

must be replenished and the machines must be maintained for the duration of the Contract by the Contractor as required by the Resident Engineer. Make and model can be Minolta, Canon, IBM, Epson, or an approved equivalent, and must be networked to the office computers for printing capability. Copier must remain at job Site until the DDC Field office trailer is removed from the Site.

2. The Contractor must furnish a fax service and a telephone answering service (or computer based equivalent system) at commencement of the Project for the exclusive use of the DDC Field Office. All materials must be new, sealed in manufacturer's original packaging and must have manufacturers' warrantees. All items must remain the property of the City of New York at the completion of the Project.

3. COMPUTER WORKSTATION: The Contractor must provide one (1) complete computer workstation, in quantities specified in sub-section 3.8.B.3, as specified herein:

   a. Hardware/Software Specification:

      1) Computer Equipment: Computers must be provided for all Contracts that have a total Consecutive Calendar Days (CCD) for construction duration, as set forth in Schedule "A", of 180 CCD's or greater. Contracts of lesser duration must not require computers.

      2) Computers furnished by the Contractor for use by City Personnel for the duration of the Contract must be in accordance with the Specific Requirements contained herein, must remain the property of the City of New York at the completion of the Project, and must meet the following minimum requirements:

      3) Personal Computers – Personal Computers must meet the requirements of the US General Services Administration (GSA) Government-Wide Strategic Solutions (GSS) Standard Laptop, Desktop, and Tablet Specifications, V7. (Available online at (Government-Wide Strategic Solutions (GSS) Version 7 Specifications | NITAAC (nih.gov)).

         (a) Computer type for Personal Computers to be “Desktop Small Form Factor.” Computer type for tablet to be “Tablet”
         (b) The following components listed as optional in the GSA specification must be provided with each personal computer: monitor, speakers, optical drive, smart card reader, webcam, and headset.
         (c) The following additional software must be provided with licenses for each computer:
            1. Adobe Acrobat Pro DC or Bluebeam Revu
            2. Microsoft Office Professional
            3. Autodesk AutoCAD LT
            4. Anti-virus software
            5. Microsoft Visio (only one license required per field office)

      iv. DDC Field Office Specs: DDC Field Offices requiring computers must be provided with the following:

         a) One (1) broad-band internet service account. See table below for minimum required upload and download speeds. Telephone service should be bundled together with Internet connectivity. Because of throughput requirements Verizon FIOS is the preferred connectivity provider where available.

Office Personnel #	**Download Speeds (*Minimum*)**	**Upload Speeds (*Minimum*)**
1 – 5	10 Mbps	15 Mbps

6 – 10	20 Mbps	15 Mbps
11 – 15	25 Mbps	15 Mbps
16 – 20	50 Mbps	15 Mbps

This account will be active for the life of the Project. The e-mail name for the account must be the DDC Field Office/Project ID (preferably Gmail or Outlook e.g. ABC1234@gmail.com).

b) One (1) 600 DPI HP Color Laser Jet Printer (twelve (12) pages per minute or faster) with one (1) Extra Paper (Legal Size) (Not required if photocopying machine prints in color).

c) All necessary cabling for equipment specified herein

d) Storage Boxes for Blank CD's

e) Printer Table

f) UPS/Surge Suppressor combo

g) Ten (10) USB Thumb (or Flash) Drives – sixteen (16) GB each

5) All computers required for use in the DDC Field Office must be delivered, installed, and setup in the Field Office by the Contractor.

6) All Computer Hardware must come with a three (3) year warranty for on-site repair or replacement. Additionally, and notwithstanding any terms of the warranty to the contrary, the Contractor is responsible for rectifying all computer problems or equipment failures within one (1) business day.

7) An adequate supply of blank CDs/DVDs, and paper and toner cartridges for the printer must be provided by the Contractor and must be replenished by the Contractor as required by the Resident Engineer.

8) It is the Contractor's responsibility to ensure that electrical service and phone connections are also available at all times; that is, the Field Office Computer(s) is to be powered and turned on twenty-four (24) hours each Day.

9) Broadband connectivity is preferred at each field office location. Please take into consideration that an extra phone line dedicated to the modem must be ordered as part of the Contract unless Internet broadband connectivity, via Cable or DSL, is available at the planned field office location. Any questions regarding this policy should be directed to the Assistant Commissioner of ITS at 718-391-1761.

E. HEAD PROTECTION (HARD HATS):

1. The Contractor must provide a minimum of ten (10) standard protective helmets for the exclusive use of DDC personnel and their visitors. Helmets must be turned over to the Resident Engineer and kept in the DDC Field Office.

2. Upon completion of the Project, the helmets must become the property of the Contractor.

F. PAYMENT FOR DDC FIELD OFFICE

1. The DDC Field Office will be paid monthly on a unit price basis.

2. MEASUREMENT. The quantity to be measured for payment under this item will be the number of months that the DDC Field Office is available for occupancy by the Commissioner during the period of the Project. Payment will begin the first month that the DDC Field Office is fully equipped, serviced

as specified, and made available for occupancy. The DDC Field Office is to be continuously made available and monthly payments will continue for the duration of the Project through a period not to exceed 6 months past the Substantial Completion date. When directed in writing by the Commissioner, the DDC Field Office will be provided and paid for a period of time beyond 6 months past the Substantial Completion date. Payment for each month's occupancy after the date of Substantial Completion acceptance will be made as part of the final payment. Monthly payments may be terminated on a specified date prior to acceptance of the Project by written notification by the Commissioner that such office will no longer be required on the Project.

3. PRICE TO COVER. The unit price bid per month for the item DDC Field Office shall include the cost of furnishing all labor, materials, equipment, ground rental, fire and theft insurance, and utility charges necessary to complete the work of providing or constructing the field office; making all necessary electrical, water, sewer, and other connections required to make the above facilities operative; payment of all rental costs; furnishing and paying for heating fuel, as required; all electrical energy; private telephone services; staples, as specified; and all necessary incidentals to complete the work all in accordance with the specifications and the directions of the Commissioner.

3.9 MATERIAL SHEDS:

A. Material sheds used by the Contractor for the storage of its materials must be kept at locations which will not interfere at any time with the progress of any part of the Work or with visibility of traffic control devices.

B. The Contractor must store combustible materials apart from the facility.

3.10 TEMPORARY ENCLOSURES:

A. The Contractor must provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.

B. Where heating or cooling is needed and Permanent Enclosure is not complete, the Contractor must insulate temporary enclosures.

3.11 TEMPORARY PARTITIONS:

A. The Contractor must provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate occupied tenant areas from fumes and noise, including, but without limitation:

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.

2. Construct dustproof partitions with 2 layers of 3-mil (0.07-mm) polyethylene sheet on each side. Cover floor with two (2) layers of 3-mil (0.07-mm) polyethylene sheet, extending sheets eighteen (18) inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant plywood.

   a. Construct vestibule and airlock at each entrance through temporary partition with not less than forty-eight (48) inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.

3. Insulate partitions to provide noise protection to occupied areas.

4. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.

5. Protect air-handling equipment.

6. Weather strip openings.

7. Provide walk-off mats at each entrance through temporary partition.

3.12 TEMPORARY FIRE PROTECTION:

A. The Contractor must install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with National Fire Protection Association (NFPA) Standard 241.

B. Smoking in all areas is prohibited.

C. The Contractor must supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.

D. The Contractor must develop and supervise an overall fire-prevention and protection program for personnel at Project Site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

E. The Contractor must provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.13

3.13 WORK FENCE ENCLOSURE:

A. The Contractor must furnish, erect and maintain a wood construction or chain-link fence to the extent shown on the Contract Drawings or required by the Work enclosing the entire Project on all sides. All materials used must be new. Any permit required for the installation and use of said fence and costs must be borne by the Contractor.

B. WOOD FENCE must be seven (7) feet high with framing construction of yellow pine, using 4" x 4" approved preservative-treated posts on not more than 6'-0" centers, with three (3) rails of at least 2" x 4" size to which must be secured minimum 1/2 inch thick exterior grade plywood. Posts must be firmly fixed in the ground at least 30" and thoroughly braced. Top edge of fence must be trimmed with a rabbeted edge mould. Provide on the street traffic sides of fence, observation openings as directed.

1. GATES: The Contractor must provide an adequate number of double gates, complete with hardware, located as approved by the Resident Engineer. Double gates must have a total clear opening of 14'-0" with two (2) 7'-0" hinged swinging sections. Hanging posts must be 6" x 6" and must extend high enough to receive and be provided with tension or sag rods for the swinging sections.

2. PAINTING: The fence and gates must be entirely painted on the street and public sides with one (1) coat of exterior primer and one (1) top coat of exterior grade acrylic-latex emulsion paint. Black stenciled signs reading "POST NO BILLS" must be painted on fence with three (3) inch high letters on twenty-five (25) foot spacing for the entire length of fence on street traffic sides. Signs must be stenciled five (5) feet above the sidewalk.

C. CHAIN-LINK FENCING must be minimum two (2) inch thick, galvanized steel, chain-link fabric fencing; eight (8) feet high with galvanized steel pipe posts; minimum 2-3/8-inch Outside Diameter (OD) line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top and bottom rails. Fence must be accurately aligned and plumb, adequately braced and complete with gates, locks and hardware as required. Under no condition must fencing be attached or anchored to existing construction or trees.

D. ADDITIONAL REQUIREMENTS:

1. It must be the obligation of the Contractor to remove all posters, advertising signs, and markings, etc., immediately.

2. Should the fencing be required to be relocated during the course of the Contract, it must be done by

the Contractor at no additional cost to the City.

3. Where sidewalks are used for "drive over" purposes for Contractor vehicles, a suitable wood mat or pad must be provided for protection of sidewalks and curbs.

4. Where required, make provision for fire hydrants, lampposts, etc.

E. REMOVAL: When directed by the Commissioner, the fence must be removed.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.14

3.14 RODENT AND INSECT CONTROL:

A. DESCRIPTION: The Contractor must provide all labor, materials, plant and equipment, and incidentals required to survey and monitor rodent activity and to control any infestation or outbreak of rodents, rats, mice, water beetles, roaches and fleas within the Project area. Special attention should be paid to the following conditions or areas:

1. Wet areas within the Project area, including all temporary structures.

2. All exterior and interior temporary toilet structures within the Project area.

3. All Field Offices and shanties within the Project area of all Subcontractors and DDC.

4. Wherever there is evidence of food waste and/or discarded food or drink containers, in quantity, that would cause breeding of rodents or the insects herein specified.

5. Any other portion of the Site requiring such special attention.

B. MATERIALS:

1. All materials must be approved by the New York State Department of Environmental Conservation (DEC) and comply with the New York City Health Code, OSHA and the laws, ordinances and regulations of state and federal agencies pertaining to such chemical and/or materials.

C. PERSONNEL:

1. All pest control personnel must be supervised by an exterminator licensed in categories 7A and 8.

D. METHODS:

1. Application and dosage of all materials must be done in strict compliance with the manufacturer's recommendations.

2. Any unsanitary conditions, such as uncollected garbage or debris, resulting from all Contractor's activities, which will provide food and shelter to the resident rodent population must be corrected by the Contractor immediately after notification of such condition by the Resident Engineer.

E. RODENT CONTROL WORK:

1. In wetlands, woodlands, and areas adjacent to a stream, special precautions must be taken to protect water quality and to ensure the safety of other wildlife. To prevent poisoned bait from entering streams, no poisoned bait must be used in areas within seventy-five (75) feet of all stream banks. Live traps must be used in these seventy-five (75) foot buffer zone areas and within wetland and woodland areas.

2. In areas outside the seventy-five (75) foot zone of protection adjacent to streams, and in areas outside wetlands and woodlands, tamper proof bait stations with poisoned bait must be placed during the period of construction and any consumed or decomposed bait must be replenished as directed.

3. At least one (1) month prior to initiation of the construction Work, and periodically thereafter, live traps and/or rodenticide bait in tamper proof bait stations, as directed above, must be placed at locations that do not allow access to pets, human beings, children and other non-target species, particularly wildlife (for example-birds) in the Project area.

4. The Contractor must be responsible for collecting and disposing of all trapped and poisoned rodents found in live traps and tamper-proof bait stations. The Contractor must also be responsible for posting and maintaining signs announcing the baiting of each particular location.

5. The Contractor must be responsible for the immediate collection and disposal of any visible rodent remains found on streets or sidewalks within the Project area.

6. It is anticipated that public complaints will be addressed to the Commissioner. The Contractor, where directed by the Commissioner, must take appropriate actions, like baiting, trapping, proofing, etc., to remedy the source of complaint within the next six (6) hours of normal working time which is defined herein for the purposes of this section as 7 A.M. to 6 P.M. on Mondays through Saturdays.

7. Emergency service during the regular workday hours (Monday through Friday) must be rendered within twenty-four (24) hours, if requested by the Commissioner, at no additional cost to the City.

F. EDUCATION & NOTICES:

1. The Contractor must post notices on all Construction Bulletin Boards advising workers, employees, and residents to call the DDC Field Office to report any infestation or outbreak of rodents, rats, mice, water beetles, roaches and fleas within the Project area. The Contractor must provide and distribute literature pertaining to Integrated Pest Management (IPM) techniques of rodent control to affected businesses and superintendents of nearby residential buildings to ensure their participation in maintaining their establishments free of unsanitary conditions, harborage removal and rodent proofing.

2. Prior to application of any chemicals, the Contractor must furnish to the Commissioner copies or sample labels for each pesticide, antidote information, and Material Data Safety Sheets (MSDS) for each chemical used.

G. RECORDS

1. The Contractor must keep a record of all rodent and waterbug infestation surveys conducted and make available, upon request, to the Commissioner. The findings of each survey must include, but not be limited to, recommended IPM techniques, like baiting, trapping, proofing, etc., proposed for rodent and waterbug pest control.

2. The Contractor must maintain records of all locations baited along with the type and quantity of rodenticide and insecticide bait used, using the NYC Pesticide Use Reporting System (“NYCPURS”). These records will be kept by the Commissioner. A weekly report from NYCPURS must be prepared, signed and certified by the approved licensed exterminator retained by the Contractor. Such reports must be submitted to the Commissioner each week, prior to payment.

H. PAYMENT FOR RODENT AND INSECT CONTROL

1. Payment for rodent and inspect control will be made on a unit price basis.

2. The quantity to be measured for payment under this item will be the number of months (to the nearest 1/4 month increment) that the Contractor satisfactorily provides for rodent and insect

control in accordance with these specifications.

3. The unit price bid per month for rodent and insect control must include the cost of furnishing all labor, materials, plant, equipment, insurance and incidentals required to provide rodent and insect control, all in accordance with the Contract Drawings, these specifications, and the directions of the Commissioner.

3.15 PLANT PEST CONTROL REQUIREMENTS AND TREE PROTECTION REQUIREMENTS:

A. Plant Pest Control Requirements: The Contractor and its Subcontractors, including the Certified Arborist described below, must comply with all federal and New York State laws and regulations concerning Asian Longhorned Beetle (ALB) management, including protocols for ALB eradication and containment promulgated by the New York State Department of Agriculture and Markets (NYSDAM). The Contractor is referred to: (1) Part 139 of Title 1 NYCRR, Agriculture and Markets Law, Sections 18, 164 and 167, as amended, and (2) State Administrative Procedure Act, Section 202, as amended.

1. All tree Work performed within the quarantine areas must be performed by NYSDAM certified entities. Transportation of all host material, living, dead, cut or fallen, inclusive of nursery stock, logs, green lumber, stumps, roots, branches and debris of a half inch or more in diameter from the quarantine areas is prohibited unless the Contractor or its Subcontractor performing tree Work has entered into a compliance agreement with NYSDAM. The terms of said compliance agreement must be strictly complied with. Any host material so removed must be delivered to a facility approved by NYSDAM. For the purpose of this Contract, host material must be ALL species of trees.

2. Any host material that is infested with the ALB must be immediately reported to NYSDAM for inspection and subsequent removal by either State or City contracts, at no cost to the Contractor.

3. Prior to commencement of tree Work, the Contractor must submit to the Commissioner a copy of a valid ALB compliance agreement entered into with NYSDAM and the Contractor or its Subcontractor performing tree Work. If any host material is transported from the quarantine area the Contractor must immediately provide the Commissioner with a copy of the New York State ‘Statement of Origin and Disposition’ and a copy of the receipt issued by the NYSDAM approved facility to which the host materials are transported.

4. Quarantine areas, for the purpose of this Contract, must be defined as all five boroughs of the City of New York. In addition, prior to the start of any tree Work, the Contractor must contact the NYC Department of Parks & Recreation’s (DPR) Director of Landscape Management at (718) 699-6724, to determine the limits of any additional quarantine areas that may be in effect at the time when tree Work is to be performed. The quarantine area may be expanded by federal and state authorities at any time and the Contractor is required to abide by any revisions to the quarantine legislation while working on this Contract. For further information please contact: NYSDAM (631) 288-1751.

B. Tree Protection Requirements: The Contractor must retain a Certified Arborist, as defined by DPR regulations, to provide the services described below.

1. Surveys and Reports: The Certified Arborist must, at the times indicated below, conduct a survey and prepare a plant material assessment report which includes: (1) identification, by species and pertinent measurements, of all plant material located on the Project Site, or in proximity to the Project Site, as described below, including all trees, significant shrubs and/or planting masses; (2) identification and plan for the containment of plant pests and pathogens, including the ALB, as described in paragraph A above; and (3) evaluation of the general health and condition of any infected plant material.

2. Frequency of Reports: The Certified Arborist must conduct a survey and provide a plant material assessment report at two (2) points in time: (1) prior to the commencement of construction Work; and (2) at the time of Substantial Completion. In addition, for projects exceeding twenty-four (24) months in duration, the Certified Arborist must conduct a survey and prepare a report at the midpoint of

construction. Copies of each plant material assessment report must be submitted to the Resident Engineer within two (2) weeks of the survey.

3. Proximity to Project Site: Off-site trees, significant shrubs and/or planting masses must be considered to be located in proximity to the Project Site under the circumstances described below.

   a. The tree trunk, significant shrub, or primary cluster of stems in a planting mass is within fifty (50) feet of the project's Contract Limit Lines (CLLs) or Property Lines (PLs).

   b. Any part of the tree or shrub stands within fifty (50) feet of: (a) a path for Site access for vehicles and/or construction equipment; or (b) scaffolding to be erected for construction activity, including façade remediation projects.

   c. The Certified Arborist determines that the critical root zone (CRZ) of an off-site tree, significant shrub, or primary cluster of stems in a planting mass extends into the Project Site, whether or not that plant material is located within the fifty (50) foot inclusionary perimeter as outlined above.

4. Tree Protection Plan: The Certified Arborist must prepare, and the Contractor must implement, a Tree Protection Plan for all trees that may be affected by any construction Work, excavation or demolition activities, including without limitation: (1) on-site trees, (2) street trees, as defined below, (3) trees under DPR jurisdiction as determined by the NYC Department of Transportation, and (4) all trees that are located in proximity to the Project Site, as defined above. The Tree Protection Plan must comply with the DPR rules, regulations and specifications. The Contractor is referred to Chapter 5 of Title 56 of the Official Compilation of the Rules of the City of New York. Copies of the Tree Protection Plan must be submitted to the Resident Engineer prior to the commencement of construction. Implementation of the Tree Protection Plan for street trees and trees under DPR jurisdiction must be in addition to any tree protection requirements specified or required for the Project Site. For the purpose of this article, a "street tree" means the following: (1) a tree that stands in a sidewalk, whether paved or unpaved, between the curb lines or lateral lines of a roadway and the adjacent property lines of the Project Site, or (2) a tree that stands in a sidewalk and is located within fifty (50) feet of the intersection of the Project's Site's PL with the street frontage property line.

C. No Separate Payment: No separate payment must be made for compliance with Plant Pest Control Requirements or Tree Protection Requirements. The cost of compliance with Plant Pest Control Requirements and Tree Protection Requirements must be deemed included in the Contractor's bid for the Project.

3.16 PROJECT IDENTIFICATION SIGNAGE:

A. The Contractor must provide, install and maintain Project identification and other signs where indicated to inform public and individuals seeking entrance to the Project.

B. In order to properly convey notice to persons entering upon a City construction Site, the Contractor must furnish and install a sign at the entrance (gates) as follows:

NO TRESPASSING

AUTHORIZED PERSONNEL ONLY

C. If no construction fence exists at the Site, this notice must be conveyed by incorporating the above language into safety materials (barriers, tape, and signs).

D. Provide temporary, directional signs for construction personnel and visitors.

E. Maintain and touch up signs so that they are legible at all times.

3.17 PROJECT CONSTRUCTION SIGN AND RENDERING:

A. PROJECT SIGN:

1. Responsibility: The Contractor must produce and install one (1) Project sign which must be posted and maintained upon the Project Site at a place and in a position directed by the Commissioner. The Contractor must protect the sign from damage during the continuance of Work under the Contract and must do all patching of lettering, painting and bracing thereof necessary to maintain the sign in first class condition and in proper position. Prior to fabrication, the Contractor must submit an 8-1/2” x 11” color match print proof from the sign manufacturer of the completed sign for approval by the Commissioner.

2. Sign Quality: The Contractor must provide all materials required for the production of the sign as specified herein. Workmanship must be of the best quality, free from defects and must be produced in a timely manner.

3. Schedule: Upon Project mobilization, the Contractor must commence production and installation of the sign.

4. Removal: At the completion of all Work under the Contract, the Contractor must remove and dispose of the Project sign away from the Site.

5. Sign construction:

   a. Frame: The frame must be from quality dressed 2”x2” pine, fire retardant, pressure treated lumber, that surrounds the inside back edge of the sign. The sign must have one (1) intermediate vertical and two (2) diagonal supports, glued and screwed for rigidity. Frame must be painted white with two (2) coats of exterior enamel paint, prior to mounting of sign panel.

   b. Edging: U-shaped, twenty-two (22) gauge aluminum edging, with a white enameled finish to match sign background, must run around entire edging of sign panel and frame. Corners must be mitered for a tight fit. Channel dimensions must be 1” inch (overlap to sign panel face) x 1 3/4" (or as required across frame depth) x 1" (back overlap).

   c. Sign Panel: 4' x 8' panel must be constructed in one (1) piece of fourteen (14) gauge (.0785") 6061-T6 aluminum. This panel must be pre-finished both sides with a glossy white baked-on enamel finish and be flush with edge of 2" x 2" wood frame. Samples must be submitted for approval.

   d. Fastening: Fasten sign panel to wood frame using cadmium plated no. 8 sheet metal screws at ½" below edge of panel and 8" on center. The U-shaped aluminum channel must be applied over the wood frame edge and fastened with cadmium plated no. 8 sheet metal screws at 12" on center around the entire perimeter.

6. Sign Graphics:

   a. A digital file of the Project sign will be provided to the Contractor by the Commissioner’s representative for printing. The Commissioner’s representative must insert the Project name and names and titles of personnel (three (3) or more) and any other required information associated with the Project. All signs may include a second panel for a Project rendering as described in sub-section 3.17.B herein.

   b. The digital file must be reproduced at the Sign Panel size of 4’ x 8’ on 3M High Performance Vinyl or approved equal. The 3M High Performance Vinyl or equivalent must be guaranteed for nine (9) years. Guarantee must cover fading, peeling, chipping or cracking. The sign manufacturer is

required to maintain all specified Pantone Matching System (PMS) type and other composition elements represented in the digital file of the Project sign.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SETION 3.17 B

B. PROJECT RENDERING:

1. Responsibility: In addition to the Project sign, the Contractor must furnish and install one (1) sign showing a rendering of the Project. A digital file of the Project rendering will be provided to the Contractor by the Commissioner's representative. From an approved image file provided by DDC, the Project rendering is to be sized, printed, and mounted in an identical manner as described in sub-section 3.17.A above for the Project sign. A color match print proof from the sign manufacturer of the rendering sign printed from the supplied file is to be submitted to DDC for approval before fabrication. The rendering sign is to be posted at the same height as the Project sign. Where possible, the rendering sign must be mounted with a perfect match of the short sides of the rectangle so that the rendering sign and the Project sign together will create one long rectangle.

2. Removal: At the completion of all Work under the Contract, the Contractor must remove and dispose of the Project rendering away from the Site.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.18

3.18 SECURITY GUARDS/FIRE GUARDS ON SITE:

A. SECURITY GUARDS (WATCHMEN):

1. The Contractor must provide a competent security guard service on the Site, beginning on the date on which the Contractor commences actual construction Work, or on such earlier date on which there is activity at the Site related to the Work, including without limitation, delivery of materials or construction set-up. The Contractor must continue to provide such security guard service until the date on which it completes all required Work at the Site, including all punch list Work, as certified in writing by the Resident Engineer, or earlier if so directed in writing by the Commissioner. Throughout the specified time period, there must be no less than one (1) security guard on duty every day, including Saturdays, Sunday and holidays, twenty-four (24) hours a day, except between the hours of 8:00 A.M. and 4:00 P.M. on any day that the Contractor is present. This exception during the working day must not apply after the finishing painting of the plaster Work is commenced; thereafter, not less than one (1) security guard must be on duty continuously, twenty-four (24) hours a day.

2. Every security guard must be required to hold a "Certificate of Fitness" issued by FDNY. Every security guard must, during his/her tour of duty, perform the duties of fire guard in addition to his/her security obligations.

3. Should the Commissioner find that any security guard is unsatisfactory, such guard must be replaced by the Contractor upon the written demand of the Commissioner.

4. Each security guard furnished by the Contractor must be instructed by the Contractor to include in his/her duties the entire construction Site including the Field Office, temporary structures, and equipment, materials, etc.

5. Should the Contractor or any other Subcontractor consider the security requirements outlined above inadequate, the Contractor must provide such additional security as it thinks necessary, after obtaining the written consent of the Commissioner. The additional cost of such approved increased protection will be paid by the Contractor.

6. Nothing contained in this sub-section must diminish in any way the responsibility of the Contractor and each Subcontractor for its own Work, materials, tools, equipment, nor for any of the other risks and obligations outlined hereinbefore in this Article.

B. COSTS: The Contractor must employ security guards/fire guards throughout the specified time period, except as otherwise modified by the detailed Specifications and as approved by the Commissioner, for the purpose of safeguarding and protecting the Site. All costs for security guards/fire guards must be borne by the Contractor.

C. RESPONSIBILITY: The Contractor and its Subcontractors will be responsible for safeguarding and protecting their own work, materials, tools and equipment.

D. PAYMENT FOR SECURITY GUARDS

1. Payment for security guards will be made on a unit price basis.

2. The quantity to be measured for payment under this item will be the number of months (to the nearest 1/4 month increment) that the Contractor satisfactorily provides for security guards in accordance with these specifications.

3. The unit price bid per month for security guards must include the cost of furnishing all labor, materials, plant, equipment, insurance and incidentals required to provide security guards, all in accordance with the Contract Drawings, these specifications, and the directions of the Commissioner.

3.19 SAFETY:

A. The Contractor, in compliance with requirements of Section 01 35 26, SAFETY REQUIREMENTS PROCEDURES, must provide and maintain all necessary temporary closures, guard rails, and barricades to adequately protect all workers and the public from possible injury. Any removal of these items, during the progress of the Work, must be replaced by the Contractor at no additional cost to the City.

END OF SECTION 01 50 00

SECTION 01 54 11
TEMPORARY ELEVATORS AND HOISTS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes the following:
   1. Temporary Use, Operation and Maintenance of Elevators during Construction
      a. For new buildings up to and including fifteen (15) stories
      b. For new buildings over fifteen (15) stories
      c. For existing buildings
   2. Temporary Construction Hoists and Hoistways (For Material and Personnel)

1.3 RELATED SECTIONS: include without limitation the following:

A. Section 01 10 00 SUMMARY

B. Section 01 42 00 REFERENCES

C. Section 01 50 00 TEMPORARY FACILITIES AND CONTROLS

D. Section 01 54 23 TEMPORARY SCAFFOLDS AND SWING STAGING

E. Section 01 77 00 CLOSE OUT PROCEDURES

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.1

3.1 TEMPORARY USE, OPERATION AND MAINTENANCE OF ELEVATORS DURING CONSTRUCTION FOR NEW BUILDINGS UP TO AND INCLUDING FIFTEEN (15) STORIES:

A. INSTALLATION: The Contractor must install, complete, operate, and maintain in good working order, as indicated herein, one (1) selected main elevator for the transport of employees of the Contractor and/or its Subcontractors, representatives of DDC, and other governmental agencies having jurisdiction of Work at the Project. The Contractor must furnish, install, and maintain such elevator in good working order, including all necessary hoisting ropes, governor cables, traveling conductor cables, operating devices, temporary hand reset target annunciators, temporary signal devices, and all other permanent or temporary parts. The installation, operation and maintenance of the temporary elevator and all equipment and/or parts utilized in connection therewith must be in accordance with the rules and regulations of all agencies and/or entities having jurisdiction over elevators in temporary use.

B. RESPONSIBILITY: The Contractor must be responsible for any injury to persons or damage to property arising out of the temporary elevator and all equipment and/or parts utilized in connection therewith.

C. COSTS: The Contractor must be responsible for all costs in connection with the temporary elevator, including without limitation:

1. Installing and operating the temporary elevator;
2. Maintaining the temporary elevator in clean and proper operating condition, including the cost of lubricants and/or parts for such maintenance;
3. Performing all Work in pits, shaft ways and machine rooms necessary for the operation of the temporary elevator;
4. Replacing the temporary elevator or any equipment or parts utilized in connection therewith, if required, due to damage, destruction, or excessive wear or corrosion, except for the replacement of hoisting ropes as set forth below;
5. Performing all required electrical Work in connection with the temporary elevator;
6. Providing all electric power required to operate the temporary elevator;
7. Providing all necessary conduit and wiring connections for the proper operation and signaling of the temporary elevator; and
8. Providing all labor for the operation and maintenance of the temporary elevator, including on an overtime basis if necessary.

The total Contract price must include all costs in connection with the temporary elevator, including without limitation, the costs specified herein.

D. COMMENCEMENT OF SERVICE: The Contractor must begin to provide temporary elevator service using the selected main passenger elevator no later than eight (8) weeks (forty (40) Days) after the machine room roof slab, or that portion of it surrounding the elevator shaft, has been placed. No later than three (3) weeks (fifteen (15) Days) after the machine room roof slab has been placed, or that portion of it surrounding the elevator shaft, the following Work must be completed:

1. The shaft must be completely enclosed by either a permanent or temporary enclosure meeting all building code requirements.
2. The machine room must be completely watertight either by permanent or temporary construction. Beams or other devices, either permanent or temporary, must be provided to enable the safe and practicable hoisting of the elevator machinery for installation.
3. On all floors at the shaft way entrances to the elevator, the Contractor must install solid substantial frames, either sliding or swing doors with substantial hardware and door locks, and any necessary approved wire mesh barricades for adjacent shaft ways.
4. The Contractor must furnish and install solid, substantial enclosures at front, back, sides and top of car platform enclosure, with an emergency exit at the top of car and a substantial temporary door or gate on the front of the elevator entrance.

E. ELECTRICAL INSTALLATION: The Contractor, no later than twenty (20) Days after the machine room roof slab or that portion of it surrounding the elevator has been placed, must furnish and install temporary or permanent power and light feeders as required for the elevator used for temporary service. Additionally, the Contractor must connect such feeders to the terminals on the starter panels or controllers in the machine room to the low voltage transformers and car light outlets in the center of the shaft way and for the car control and signal traveling cables. The Contractor must make all these required connections as soon as the equipment is declared ready for such connections by the Resident Engineer.

F. REMOVAL: As directed by the Commissioner and when elevators for permanent use have been installed and are in proper condition for service, the Contractor must remove the temporary enclosures and all temporary elevator equipment and promptly proceed with the installation of the permanent equipment as required under the Contract.

G. INSPECTION: Before temporary elevator equipment is removed, a joint inspection of the equipment must be made by the Contractor and the Commissioner to determine the condition of this equipment upon the discontinuation of its temporary use. If this inspection deems it necessary, the Contractor must furnish and install new governor and compensating ropes, traveling cables, controller parts, etc. The car and counterweight safeties must be thoroughly cleaned of all dirt and all foreign matter, then properly lubricated and placed in good operating condition to the satisfaction of the Commissioner. If it is determined and ordered by the Commissioner that new hoist ropes are required, such ropes must be installed and payment will be made in accordance with Article 26 of the Contract.

H. REPLACEMENT: The Contractor must furnish and install new equipment or parts for any equipment or parts of the temporary elevator installation that have been damaged, destroyed, or that indicate excessive wear or corrosion, except for the replacement of hoisting ropes. All shaft ways, pits, motor rooms and sheave spaces used for temporary operation of elevators must be thoroughly cleaned. Where lubricated rails are used they must be washed down. If roller guides are used, all rust, dirt, etc., must be moved from the rails. The full cost of parts replacement, cleaning, etc., must be borne by the Contractor except for the replacement of hoisting ropes.

I. LIMITATIONS ON USE: The temporary elevator must not be used during its operation for the hoisting of materials or the removal of rubbish, but must be limited only to the transportation of employees of the Contractor and/or its Subcontractors, representatives of DDC, and other governmental agencies having jurisdiction of work at the Project. However, the Resident Engineer may grant special permission at specified times to the Contractor and/or its Subcontractors to hoist materials, which in the Resident Engineer's opinion will not overload or damage the elevator installation. In the event of any damage to the temporary elevator, the Contractor must notify the Resident Engineer within twenty-four (24) hours after such damage has occurred. As indicated above, the Contractor must be responsible for the replacement of any equipment or parts of the temporary elevator that have been damaged.

J. LIQUIDATED DAMAGES: The Contractor will be charged at the rate of one hundred dollars ($100) per Day for each Day it fails to provide the temporary elevator service described in this section beginning with the forty-first (41st) Day after the machine room roof slab, or that portion of it surrounding the elevator shaft, has been placed and stripped. This charge will be deducted from any amount due and owing to the Contractor.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.2

3.2 TEMPORARY USE, OPERATION AND MAINTENANCE OF ELEVATORS DURING CONSTRUCTION FOR NEW BUILDING OVER FIFTEEN (15) STORIES:

A. INSTALLATION: The Contractor must install, complete, operate, and maintain in good working order, as indicated herein, two (2) selected main elevators for the transport of employees of the Contractor and/or its Subcontractors, representatives of DDC, and other governmental agencies having jurisdiction of work at the Project. The Contractor must furnish, install, and maintain such elevators in good working order, including all necessary hoisting ropes, governor cables, traveling conductor cables, operating devices, temporary hand reset target annunciators, temporary signal devices, and all other permanent or temporary parts. The installation, operation, and maintenance of the temporary elevators and all equipment and/or parts utilized in connection therewith must be in accordance with the rules and regulations of all agencies and/or entities having jurisdiction over elevators in temporary use. The two (2) elevators must not be operated simultaneously.

B. RESPONSIBILITY: The Contractor must be responsible for any injury to persons or damage to property arising out of the temporary elevators and all equipment and/or parts utilized in connection therewith.

C. COSTS: The Contractor must be responsible for all costs in connection with the temporary elevators, including without limitation:

1. Installing and operating the temporary elevators;

2. Maintaining the temporary elevators in clean, proper operating condition, including the cost of lubricants and/or parts for such maintenance;

3. Performing all Work in pits, shaft ways and machine rooms necessary for the operation of the temporary elevators;

4. Replacing the temporary elevators or any equipment or parts utilized in connection therewith, if required due to damage, destruction, or excessive wear or corrosion, except for the replacement of hoisting ropes as set forth below;

5. Performing all required electrical Work in connection with the temporary elevators;

6. Providing all electric power required to operate the temporary elevators;

7. Providing all necessary conduit and wiring connections for the proper operation and signaling of the temporary elevators; and

8. Providing all labor for the operation and maintenance of the temporary elevators, including on an overtime basis if necessary.

The total Contract price must include all costs in connection with the temporary elevators, including without limitation, the costs specified herein.

D. LOW RISE ELEVATOR: The Contractor must begin to provide temporary elevator service using one (1) selected main passenger elevator no later than six (6) weeks (thirty (30) Days) after the twelfth (12th) floor slab, or that portion of it surrounding the elevator shaft, has been placed and stripped. No later than one (1) week, (five (5) Days), after the twelfth (12th) floor slab, or that portion of it surrounding the elevator shaft, has been placed and stripped, the following Work must have been completed:

1. The shaft must be completely enclosed up to the twelfth (12th) floor by either the permanent or a temporary enclosure meeting the requirements of the law.

2. A temporary machine room enclosure must be provided at the eleventh (11th) floor and must be completely watertight either by permanent or temporary construction. Beams or other devices, either permanent or temporary, must be provided which will enable the safe and practicable hoisting of the elevator machinery for installation.

3. The Contractor must install on all floors up to and including the ninth (9th) floor at the shaft entrances to the elevator, solid substantial wood frames, either sliding or swing doors with substantial hardware and door locks, and any necessary approved wire mesh barricades for adjacent shaft ways.

4. The Contractor must furnish and install solid substantial enclosures at front, back, sides and top of car platform enclosure, with an emergency exit at top of car, except that the portion of the front at the elevator entrance must be provided with a substantial temporary door or gate.

E. ELECTRICAL INSTALLATION: The Contractor must, no later than ten (10) Days after the twelfth (12th) floor slab or that portion of it surrounding the elevator has been poured and stripped, furnish and install temporary or permanent power and light feeders as required for the elevator used for temporary service. The Contractor must connect such feeders to the terminals on the starter panels or controllers in the temporary machine room to the low voltage transformers, car light outlets in the center of the shaftway, and for the car control and signal traveling cables. The Contractor must make all these required connections as soon as the equipment is declared ready for such connections by the Resident Engineer.

F. HIGH RISE ELEVATOR: The Contractor must begin to provide temporary elevator service to all floors using a selected main passenger elevator no later than eight (8) weeks (forty (40) Days) after the machine room roof slab, or that portion of it surrounding the elevator shaft has been placed. No later than three (3) weeks (fifteen (15) Days) after the machine room roof slab, or that portion of it surrounding the elevator shaft has been placed, the following Work must have been completed:

1. The shaft must be completely enclosed by either the permanent or temporary enclosure, meeting the

requirements of the law.

2. The machine room must be completely watertight either by permanent or temporary construction. Beams or other devices, either permanent or temporary, must be provided to enable the safe and practicable hoisting of the elevator machinery for installation.

3. The Contractor must install on all floors at the shaft way entrances to the elevator solid substantial frames, either sliding or swing doors with substantial hardware and door locks, and any necessary approved wire mesh barricades for adjacent shaft ways.

4. The Contractor must furnish and install solid substantial enclosures at front, back, sides and top of car platform enclosure, with an emergency exit at top of car, except that the portion of the front at the elevator entrance must be provided with a substantial temporary door or gate.

G. ELECTRICAL INSTALLATION: The Contractor must, not later than twenty (20) Days after the machine room slab or that portion of it surrounding the elevator shaft has been placed, furnish and install temporary or permanent power and light feeders as required for the high-rise elevator to be used for temporary service. The Contractor must connect such feeders to the terminals on the motor-generator starter panels, or controllers in the machine room, to the signal circuits low voltage transformers for the annunciators and car light outlets in the center of shaft way. The Contractor must make all these required connections as soon as the equipment is declared ready for such connections by the Resident Engineer.

H. When the high-rise elevator is completed and ready for temporary operation, the low-rise temporary elevator must be shut down.

I. REMOVAL: When directed by the Commissioner and one (1) or more elevators for permanent use have been installed and are in condition for service, the Contractor must remove the temporary enclosures, all temporary elevator equipment, and promptly proceed with the installation of the permanent equipment as required under the Contract.

J. INSPECTION: Before temporary elevator equipment is removed, a joint inspection of the equipment must be made by the Contractor and the Commissioner to determine the condition of this equipment upon the discontinuation of its temporary use. If this inspection determines it necessary, the Contractor must furnish and install new governor and compensating ropes, new traveling cables, new controller parts, etc. The car and counterweight safeties must be thoroughly cleaned of all dirt and all foreign matter, then properly lubricated and placed in good operating condition to the satisfaction of the Commissioner. If it is determined and ordered by the Commissioner that new hoist ropes are required, such ropes must be installed and payment will be made in accordance with Article 26 of the Contract.

K. REPLACEMENT: The Contractor must furnish and install new equipment or parts for any equipment or parts of the temporary elevator installations that have been damaged, destroyed, or that indicate excessive wear or corrosion, except the replacement of hoisting ropes. All shaft ways, pits, motor rooms and sheaves spaces used for temporary operation of elevators must be thoroughly cleaned down. Where lubricated rails are used they must be washed down; if roller guides are used, all rust, dirt, etc., must be removed from the rails. The full cost of parts replacement cleaning, etc., must be borne by the Contractor except for the replacement of hoisting ropes.

L. LIMITATIONS ON USE: The temporary elevators must not be used during their operation for the hoisting of materials or the removal of rubbish, but must be limited only to the transportation of employees of the Contractor and/or its Subcontractors, representatives of DDC, and other governmental agencies having jurisdiction of Work at the Project. However, the Resident Engineer may grant special permission at specified times to the Contractor and/or its Subcontractors to hoist materials, which in the Resident Engineer's opinion will not overload or damage the elevator installation, but only after such times as all plastering has been completed from the second floor up. In the event of any damage to the temporary elevator, the Contractor must notify the Resident Engineer within twenty-four (24) hours after such damage has occurred. As indicated above, the Contractor must be responsible for the replacement of any equipment or parts of the temporary elevator that have been damaged.

M. LIQUIDATED DAMAGES: The Contractor will be charged at the rate of one hundred dollars ($100) per Day for each Day it fails to provide the temporary elevator service described in this Section beginning with the thirty-first (31st) Day after the twelfth (12th) floor slab, or that portion of the twelfth (12th) floor slab surrounding the elevator shaft, has been placed and stripped. This charge will be deducted from any amount due and owing to the Contractor.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.3

3.3 TEMPORARY USE, OPERATION AND MAINTENANCE OF ELEVATORS DURING CONSTRUCTION FOR EXISTING BUILDINGS:

A. The Contractor may use, at the Commissioner's discretion, one (1) selected elevator in the building for temporary operation by the Contractor for the transportation of employees of the Contractor and/or its Subcontractors, representatives of DDC, and other governmental agencies having jurisdiction over the Work at the Project. The operation of the temporary elevator and all equipment and/or parts utilized in connection therewith must be in accordance with the rules and regulations of all agencies and/or entities having jurisdiction over elevators in temporary use.

B. RESPONSIBILITY: The Contractor must be responsible for any injury to persons or damage to property arising out of the temporary elevator and all equipment and/or parts utilized in connection therewith.

C. REPLACEMENT: The Contractor must furnish and install new equipment or parts for any equipment or parts of the elevator for temporary operation that have been damaged, destroyed, or that indicate excessive wear or corrosion, except the replacement of hoisting ropes. All shaft ways, pits, motor rooms and sheave spaces used for temporary operation of elevators must be thoroughly cleaned down. Where lubricated rails are used they must be washed down, if roller guides are used, all rust, dirt, etc., must be moved from the rails. The full cost of parts replacement, cleaning, etc., must be borne by the Contractor except for the replacement of hoisting ropes. If it is determined and ordered by the Commissioner that new hoist ropes are required, such ropes must be installed and payment will be made in accordance with Article 26 of the Contract.

D. LIMITATIONS ON USE: The temporary elevator must not be used during its operation for the hoisting of materials or the removal of rubbish, but must be limited only to the transportation of employees of the Contractor and/or its Subcontractors, representatives of DDC, and other governmental agencies having jurisdiction of Work at the Project. However, the Resident Engineer may grant special permission at specified times to the Contractor and/or its Subcontractors to hoist materials, which in the Resident Engineer's opinion will not overload or damage the elevator installation. In the event of any damage to the temporary elevator, the Contractor must notify the Resident Engineer within twenty-four (24) hours after such damage has occurred. As indicated above, the Contractor must be responsible for the replacement of any equipment or parts of the temporary elevator that have been damaged.

E. LIQUIDATED DAMAGES: The Contractor will be charged at the rate of one hundred dollars ($100) per Day for each Day it fails to provide elevator services described in this section beginning with fifteen (15) Days from Notice to Proceed (NTP). This charge will be deducted from any amount due and owing to the Contractor.

3.4 TEMPORARY HOISTS AND HOISTWAYS (FOR MATERIAL AND PERSONNEL):

A. RESPONSIBILITY: The Contractor must provide adequate numbers of material hoists for the most expeditious performance of all parts of the Work including the Work of all its Subcontractors.

B. LOCATIONS: No hoists must be constructed at such locations as to interfere with, or affect the construction of, floor arches or the Work of Subcontractors. The hoists may be located at the exterior sides of the structure or in the courtyard and extend upward adjacent to the line of window openings. The hoists must be located a sufficient distance from the exterior walls and be so protected as to prevent any of the permanent Work from being damaged, stained or marred.

C. ELEVATOR SHAFT: Wherever possible, one or more of the permanent elevator shafts may be used as temporary hoistways, providing such use complies with the requirements of the Building Code of the City of New York, has been approved by the Commissioner, and does not interfere with the progress of the Work.

D. PROTECTION FOR INTERIOR HOISTS: All interior material hoistways must be enclosed on each floor and must be adequately protected with appropriate safety guards. In no event must the protection be less than that required by law.

END OF SECTION 01 54 11

SECTION 01 54 23
TEMPORARY SCAFFOLDING AND PLATFORMS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

B. Section 01 35 26 SAFETY REQUIREMENTS PROCEDURES.

C. The Contractor must comply with the requirements of "*The City of New York Department of Design and Construction Safety Requirements".* This document is included in the Information for Bidders.

1.2 SUMMARY:

A. This Section includes administrative and general procedural requirements for Temporary Scaffolding and Platforms, including:

1. Conformance
2. Responsibility
3. Jobsite Documentation and Submittals
4. Inspections

B. This Section governs ALL scaffold used on DDC Project site(s), including but not limited to, Suspended Scaffold, Supported Scaffold, and Sidewalk Sheds.

1.3 CONFORMANCE:

A. Unless otherwise indicated, the Contractor is responsible for providing, erecting, installing, and maintaining all temporary scaffolding and platforms which must comply with requirements of Chapter 33 (Safeguards During Construction or Demolition) of the New York City (NYC) Building Code, NYC Local Law 52 of 2005, OSHA Construction Standard 1926 Subpart L, and furnishing the items and personnel set forth in this Section.

1.4 RESPONSIBILITY:

A. Jobsite Safety Coordinator: The Contractor must designate and employ a Jobsite Safety Coordinator, who must be a competent person, who must have a daily presence on the Project site during scaffold use. This designee must possess and maintain a valid New York City Department of Buildings (DOB) supported scaffold certificate of completion. An alternate must also be designated in the event that the Jobsite Safety Coordinator is absent. The Jobsite Safety Coordinator must:

1. Verify completeness of documentation and submittals (as described below);
2. Verify that inspections are performed, including pull tests (see below), reports are filed and reported deficiencies are corrected;
3. Monitor trades using scaffold;
4. Limit access to scaffold areas that are tagged for non-use;
5. Inform trades of scaffold load limitations;
6. Monitor loading of decks;
7. Verify that any ties that are temporarily removed are properly restored in the same shift;
8. Verify that outriggers and planks that are moved are properly set up and secured;
9. Verify that all scaffold decks in use have proper access/egress;
10. Verify that all open sides of decks in excess of 14 inches have proper guardrails and toe-boards;

11. Notify appropriate parties, including but not limited to the Resident Engineer, Site Safety Coordinator / Monitor, Site Safety consultant, scaffold users, Contractor and the Scaffold Engineer, of misuses, non-conformances, hazards and accidents; and,
12. Keep a log of significant actions and events connected with the scaffolding.

B. The Contractor will be responsible for erecting, maintaining, and dismantling the scaffolding and/or sidewalk shed in conformance with requirements of the NYC Building Code, OSHA and the Contract Documents, including the Specifications. The Contractor must also be guided by generally accepted standards of scaffold industry practice as promulgated by the Scaffold Industry Association.

C. The Contractor must require the Subcontractor responsible for erecting the scaffolding to engage a Scaffold Engineer, licensed as a professional engineer by the State of New York. The Scaffold Engineer will be responsible to ensure the following: (1) that the installation design is in compliance with requirements of the NYC Building Code and OSHA, (2) that the design comports with the capabilities of the components and the characteristics of the site, (3) that scaffold loads on the host building, including netting, have been properly considered, and (4) that the design documents provide accurate information for erectors and users.

D. Scaffold users are trade contractors assigned to work on the scaffold. Training certificates from a DOB-approved training provider are mandatory. These users have a duty to become familiar with the NYC Building Code and OSHA requirements germane to users, to obey the instructions of the Jobsite Safety Coordinator, and to inform the Jobsite Safety Coordinator of known hazards, non-conformances, or violations.

1.5 JOBSITE DOCUMENTATION AND SUBMITTALS:

A. The Contractor must prepare, obtain, and submit the following to the Commissioner:

1. NYC DOB permit(s) for scaffold and sidewalk sheds (as applicable) including filing applications signed and sealed by a Professional Engineer licensed in the State of New York;
2. Site logistics plan / site safety plan;
3. Installation drawing(s), design, and product data to be provided for **all** scaffold(s) and shed(s) must include, at a minimum:
   a. Plan(s);
   b. Elevation(s);
   c. Duty load designation: “standard” (150 psf live load) or “heavy duty” (300 psf live load);
   d. Details including base support, anchors and ties;
   e. Notes and specifications including load limits, number of planked levels, tie spacing, netting, and sequence of installation and removal;
   f. Anchorage into sound material;
   g. Load limits based on pull tests;
   h. Specifications for pull test(s), method, proof load and the number of trials;
   i. Elevations, levels or heights, where anchorage is made into masonry;
   j. Specifications for frames, planks, screw jacks, anchors, and any other ancillary hardware;
   k. Samples for anchors, ties and netting;
   l. Sequence of operations for erection and demolition;
   m. Location plan, heights, widths, “jumps” over doorways and driveways;
   n. Specify size, maximum span and maximum spacing of headers and stringers;
   o. Specify legs, girts, braces, nailing and connections; and,
   p. All sidewalk sheds must be designed, engineered, signed, and sealed by a Professional Engineer licensed in the State of New York.
      i. Generic (not job-specific) engineering drawings are satisfactory for standard sheds and arrangements.

ii. Special engineering is required for custom sheds, site-specific problems or non-standard arrangements.

1.6 INSPECTIONS:

A. Signed inspection reports must be issued for each inspection and pull-test below, and must be logged and maintained on site by the Jobsite Safety Coordinator for the duration of the Project.

B. Pull testing will be required during design, and during or post erection, where anchorage is made into masonry. The Scaffold Engineer must specify the test method, proof load, and the number of trials.

C. Sidewalk sheds must be inspected after initial installation, major modification, or damage and thence every three months. Inspections must be by a Scaffold Engineer for custom sheds and by a Competent Person employed by the Contractor for standard sheds.

D. Scaffolds must be inspected by the Scaffold Engineer during erection, post-erection, and prior to use and thence every three (3) months. The Scaffold Engineer must repeat inspections after major alteration/ modification, and/or damage.

E. A Qualified Person assigned by the Contractor must inspect: the progress of erection and dismantling; and, the condition and integrity of the sidewalk sheds after high winds, major storms, and at least once per month during usage.

F. A Qualified Person assigned by the Contractor must inspect: the progress of erection and dismantling at least weekly; and, the condition and integrity of the scaffold after high winds, major storms, and at least once per month during usage.

G. Scaffolds and Sidewalk Sheds must be inspected daily by the Jobsite Safety Coordinator or alternate, prior to use by scaffold users. The inspection results must be recorded in the maintenance log and must always be available on-site.

H. At the completion of the Project, submit all inspection documents as Miscellaneous Record Documents in accordance with SECTION 01 78 39 CONTRACT RECORD DOCUMENTS.

1.7 LADDERS AND STAIRS:

A. The Contractor must provide and maintain ladders or temporary stairs extending from the street to the first story, and to and from every floor and roof level of the Project.

1.8 ACCESS AND EXITS:

A. The ladders or temporary stairs must be of acceptable size, number and location, so that proper and convenient access may be had by those required to proceed to and from all parts of the Project.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.9

1.9 PAYMENT FOR SIDEWALK SHEDS:

A. Payment for sidewalk sheds will be made on a unit price basis.

B. The quantity to be measured for payment under this item will be the number of months (to the nearest 1/4 month increment) that the Contractor satisfactorily provides for sidewalk sheds in accordance with these specifications.

C. The unit price bid per month for sidewalk sheds must include the cost of furnishing all labor, materials, plant, equipment, insurance and incidentals required to provide sidewalk sheds, all in accordance with the Contract Drawings, these specifications, and the directions of the Commissioner.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 54 23

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART I – GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.3 RELATED SECTIONS:

A. Section 01 42 00 REFERENCES for applicable industry standards for products specified.

1.4 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved by Commissioner through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics are listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure.

1.5 ACTION SUBMITTALS

A. Product Specification Submittals: Comply with requirements in Section 01 33 00 SUBMITTAL PROCEDURES. Show compliance with requirements.

B. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Review Action: If necessary, Commissioner will request additional information or documentation for evaluation and will notify Contractor of approval or rejection of proposed comparable product request.

    a. Format of Approval of Submittal: Per Article 1.6 of Section 01 33 00 SUBMITTAL PROCEDURES.
    b. Use product specified, or products by Manufacturers specified if Commissioner does not issue a decision on use of a comparable product request.

1.6 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:

    a. Name of product and manufacturer.
    b. Model and serial number.
    c. Capacity.
    d. Speed.
    e. Ratings.

3. See individual identification sections in Divisions 21, 22, 23, and 26 for additional identification requirements.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
5. Protect stored products from damage and liquids from freezing.

1.8 PRODUCT WARRANTIES

A. Warranties specified in other Sections will be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of Guaranty obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to the City of New York.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for the City of New York.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 77 00 CLOSEOUT PROCEDURES.

PART II – PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Descriptive, performance, and reference standard requirements in the Specifications establish required characteristics of products.
2. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
3. Commissioner will review and approve products with warranties meeting the requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Commissioner will make selection.

B. Or Approved Equal:

1. Comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product, or for use of a product by an unnamed Manufacturer, as designated by the term "Or approved equal".

2. Submit additional documentation required by Commissioner, in order to establish equivalency of proposed products. Evaluation of "Or approved equal" product status is by the Commissioner, whose determination is final.

C. Product Selection Procedures:

1. Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products will be considered. Comply with requirements in "Comparable Products" Article for consideration of a product by an unnamed manufacturer. Products' listing is indicated by the following:

   a. Products: Subject to compliance with requirements, provide one of the following:

      1) Manufacturer; Product designation
      2) Manufacturer; Product designation
      3) Manufacturer; Product designation
      4) Or approved equal

2. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed. Comparable products from unnamed Manufacturers will be considered. Comply with requirements in "Comparable Products" Article for consideration of a product by an unnamed manufacturer. Manufacturer's listing is indicated by the following:

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Manufacturer
      2) Manufacturer
      3) Manufacturer
      4) Or approved equal

3. Basis-of-Design Product: Where Specifications name a basis-of-design product, provide the specified product, or a comparable product by one of the other named manufacturers. Drawings may indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Specifications indicate performance requirements and physical properties, durability and other special and required features that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers. Basis-of-Design Product listing is indicated by the following:

   a. Subject to compliance with requirements, provide [product indicated on Drawings] [manufacturer's name; product name or designation] or comparable product by one of the following:

      1) Manufacturer
      2) Manufacturer
      3) Or approved equal

4. Sole Source Product (Single Proprietary): Where Specifications name a single manufacturer and product, provide the named product. A Sole Source Product selection requires prior request by the Design Consultant and approval by the Commissioner for its inclusion in specifications. Sole Source Product is indicated by the following phrase listing:

   a. Sole Source Product: Manufacturer's name and Product designation.

      1) No substitutions Permitted.

D. Visual Matching Specification: Where Specifications require "match Commissioner's sample," provide a product that complies with requirements and matches Commissioner's sample. Commissioner's decision will be final on whether a proposed product matches.

E. Visual Selection Specification: Where Specifications include the phrase "as selected by Commissioner from manufacturer's full range" or similar phrase, select a product that complies with requirements. Commissioner will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products (Or Approved Equal): Commissioner will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Commissioner may return requests without action, except to record noncompliance with these requirements:

B. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.

C. Evidence that proposed product provides specified warranty.

D. List of similar installations for completed projects with project names and addresses and names and addresses of architects and Owners, if requested.

E. Samples, if requested.

F. Submittal Requirements: Approval by the Commissioner of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements.

G. Comply with all other specified product and submittal requirements.

PART III – EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 73 00
EXECUTION

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section includes general procedural requirements governing execution of the Work including without limitation the following:

1. Delivery of Materials
2. Contractor's Superintendent
3. Surveys
4. Borings
5. Examination
6. Environmental Assessment
7. Preparation
8. Deferred Construction
9. Installation
10. Permits
11. Transportation
12. Sleeves and Hangers
13. Sleeve and Hanger Drawings
14. Cutting and Patching
15. Location of Partitions
16. Furniture and Equipment
17. Removal of Rubbish and Surplus Material
18. Cleaning
19. Security and Protection of Work Site
20. Maintenance of Site and Adjoining Property
21. Maintenance of Project Site
22. Safety Precautions for Control Circuits
23. Obstructions in Drainage Lines
24. Correction of the Work

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION
C. Section 01 33 00 SUBMITTAL PROCEDURES
D. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT & DISPOSAL
E. Section 01 77 00 CLOSEOUT PROCEDURES
F. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	Definition
Design Consultant	The entity responsible for providing design services for the Project, including, without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.5 QUALITY ASSURANCE:

A. Land Surveyor Qualifications: A professional land surveyor who is licensed in the State of New York and who is experienced in providing land-surveying services of the kind indicated.

PART II - PRODUCTS (Not Used)

PART III - EXECUTION

3.1 DELIVERY OF MATERIALS:

A. Material Orders: The Contractor must furnish to the Commissioner a copy of each material order, indicating date of order and quantity of material, and must also notify the Commissioner when materials have been delivered to the Site and in what quantities.

B. Ample Quantities: The Contractor must deliver materials in ample quantities to ensure the most prompt and uninterrupted progress of the Work so as to complete the Work within the Contract time.

C. Containers: The manufacturer's containers must be delivered with unbroken seals and must bear proper labels.

D. Deliveries: The Contractor must coordinate deliveries in order to avoid delaying or impeding the progress of the Work.

E. Handling: The Contractor must provide equipment and personnel to handle products by methods to prevent soiling or damage.

1. Promptly inspect shipments to assure products comply with requirements, quantities are correct, and products are undamaged.
2. Promptly return damaged shipments or incorrect orders to manufacturer.
3. For materials or equipment to be reused or salvaged, use special care in removal, storage and reinstallation to insure proper function in completed Work.

F. Storage: Store products in accordance with provisions of Article 3.1 of the Standard Construction Contract, and periodically inspect to assure that stored products are undamaged and are maintained under required conditions.

G. Stacking: All materials must be properly stacked in convenient places adjacent to the Site, or where directed, and protected in a satisfactory manner. Stacked materials must be arranged so as to not interfere with visibility of traffic control devices.

H. Overloading: If the Commissioner permits the storage of materials in any part of the Project area, they must be so stored as to cause no overloading.

I. No Interference: If it becomes necessary to remove and restack materials to avoid impeding the progress of any part of the Work or interfering with the Work to be done by any trade Subcontractor, the Contractor must remove and restack such materials at no additional cost to the City.

3.2 CONTRACTOR'S CONSTRUCTION SUPERINTENDENT:

A. Contractor's Construction Superintendent: The Contractor must devote its time and personal attention to the Work and must employ and retain at the Project Site, from commencement until Final Acceptance, a Contractor's Construction Superintendent. The Contractor's Construction Superintendent must be registered with the New York City Department of Buildings (DOB) in compliance with the Construction Superintendent Rule of the City of New York, be competent and capable of maintaining proper supervision and care of the Work, and be acceptable to the Commissioner. The Construction Superintendent, in the absence of the Contractor, and irrespective of any superintendent or foreman employed by any Subcontractor, must see that the instructions of the Commissioner are carried out.

B. Replacement: The Contractor's Construction Superintendent on the job must not be changed or removed without the consent of the Commissioner.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.3

3.3 SURVEYS:

A. Line and Grade: The City will establish a baseline and bench mark near the Site of the Work for use by the Contractor in connection with the performance of the Work.

B. Responsibility: The Contractor must establish all other lines and elevations required for the Work and must be solely responsible for the accuracy thereof.

C. Safeguard All Points: The Contractor must safeguard all points, stakes, grade marks and bench marks made or established by the Contractor on the Work. The Contractor must re-establish same if disturbed, and bear the entire expense of rectifying the Work if improperly installed due to not maintaining, protecting or removing without authorization from the Commissioner such established points, stakes, or marks.

D. City Monuments and Markers: No Work must be performed near City monuments or markers so as to disturb them until the said monuments or markers have been referenced or reset or otherwise disposed of by the relevant Agency or party who installed them.

E. Foundations: The Contractor must furnish certification from a licensed Surveyor that all portions of the foundation Work are located in accordance with the Contract Drawings and at the elevations required thereby. This certification must show the actual locations and the actual elevations of all the Work in relation to the locations and elevations shown on the Contract Drawings, including, but not restricted to the following:

1. The locations and elevations of all piles, if any.
2. Elevations of tops of all spread footings, tops of pile caps, and tops of all foundation walls, elevator pit walls and ramp walls.
3. Location of all footing centers and pier centers including those for exterior wall columns.
4. Location of all foundation walls including wall columns, elevator pit walls and ramp walls.

F. Wall Lines: After the first courses of masonry or stone have been laid, the Contractor must establish the permanent lines of exterior walls. The Contractor must promptly furnish certification from a licensed Surveyor in the form of signed original drawings showing the exact location of such wall lines of all portions

of all structures. Except at its own risk, the Contractor must not proceed further with the erection of walls until the Surveyor's certification has been submitted and verified for correct location of wall lines.

G. Surveyor: The Surveyor selected for any of the purposes mentioned in Paragraph E and Paragraph F above, and Paragraph I below, must be a land Surveyor licensed in the State of New York and must be subject to the approval of the Commissioner. The Surveyor must not be a regular employee of the Contractor, nor must the Surveyor have any interest in the Contract. The Surveyor's certification must represent an independent and disinterested verification of all layout. The Surveyor must report to the Department of Design and Construction's (DDC) Resident Engineer each time upon arrival to and departure from the Site and review with the Resident Engineer the data required for the Project.

H. Final Certification: Final certification must be submitted upon completion of the Work or upon completion of any subdivision of the Work as directed by the Commissioner. Any exceptions or deviations from the Contract Drawings must be noted on the final certificate and must include any maps, plates, notes, pertinent documents and data necessary, in the opinion of the Commissioner, to constitute a full and complete report.

I. Final Survey: The Contractor must submit to DDC for submission to DOB a final Survey by the licensed Surveyor showing the location of the new Work, before completion of the Work. This Survey must show the location of the first tier of beams or of the first floor; the finish grades of the open spaces on the plot; the established curb level and the location of all other Work on the plan, together with the location and boundaries of the lot or plot upon which the Work is constructed, curb cuts, all yard dimensions, etc.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.4

3.4 BORINGS:

A. The work of this article must be the responsibility of the Contractor unless otherwise indicated.

B. Reference Drawings: The boring drawings as listed on the title sheet are for information to the bidder and are to be used under the conditions as follows:

1. Boring logs: shown on the boring drawings, record information obtained under engineering supervision in the course of exploration carried out by or under the direction of DDC at the Site.

2. Soils and Rock Samples: All inferences are drawn from the indications observed as made by engineering and scientific personnel. All such inferences and all records of the Work, including soil samples and rock cores, if any, are available to bidders for inspection.

3. Certification of Samples: The City certifies that the Work was carried out as stated, and that the soil samples and rock cores were actually taken from the site at the times, places, and in the manner indicated on the boring drawings. The samples are available for inspection in DDC's Subsurface Exploration Unit.

4. Bidder's Responsibility: The bidder, however, is responsible for any conclusions to be drawn from the Work. If the bidder accepts those of the City, it must do so at its own risk. If the bidder prefers not to assume such risk, the bidder is under the obligation of employing its own experts to analyze the available information and must be responsible for any consequences of acting on their conclusions.

5. Continuity Not Guarantee: The City does not guarantee continuity of conditions shown at actual boring locations over the entire Site. Where possible, borings are located to avoid all obstructions and previous construction which can be found by inspection of the surface. The bidder is required to estimate the influence of such features from its own inspection of the Site.

3.5 EXAMINATION:

A. Existing Conditions: The existence and location of Site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning the Work, the Contractor must investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, the Contractor must verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground utilities and other construction indicated as existing are not guaranteed. Before beginning Site Work, the Contractor must investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, the Contractor must verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, water-service piping, and underground electrical services.
2. The Contractor must furnish location data for Work related to the Project that must be performed by public utilities serving the Project Site.

C. Acceptance of Conditions: Examine all existing substrates, areas, equipment, and conditions, with the Subcontractor responsible for purchase of equipment, installation or application, for compliance with requirements for installation tolerances, equipment compatibility, and other conditions affecting performance. The Contractor must record observations of these examinations:

1. Verify compatibility with and suitability of substrates and equipment, including compatibility with existing finishes, primers, electrical services, and mechanical equipment.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces, equipment, and conditions.

3.6 ENVIRONMENTAL ASSESSMENTS:

A. City Responsibilities: An Environmental Assessment and survey is performed by DDC and its findings are included in the Contract Documents. In accordance with the NYC Administrative Code Title 15 Chapter 1, an asbestos survey is required to be performed by an Asbestos Investigator certified by the NYC Department of Environmental Protection (DEP) to identify the presence of asbestos containing material (ACM) prior to any alteration, renovation, or demolition activity. The findings of such survey are required for the submission of approvals and permits issued by DOB. When the findings indicate that asbestos containing material is present and will be disturbed during the alteration, renovation, or demolition activity, then abatement design specifications will be incorporated into the Contract Documents. The Contractor must comply with all federal, state and local asbestos regulations affecting the work for this Contract.

B. Contractor Responsibility: The Contractor must comply with all federal, state and local environmental regulations, including without limitation, United States Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) regulations, which require the Contractor to assess if lead-based paint will be disturbed during the Work in order to protect the Contractor's workers and the building occupants from migration of lead dust into the air. The Contractor must comply with all federal, state and local environmental waste disposal regulations which may be required during the Work. The Contractor is required to hire licensed abatement and disposal companies for the requisite Work.

3.7 PREPARATION:

A. Field Measurements: The Contractor must verify all dimensions and conditions on the Site so that all Work will properly join the existing conditions.

B. Before commencing the Work, the Contractor must examine all adjoining materials on which its Work is in any way dependent on good workmanship in accordance to the intent of the Specifications and the Contract Drawings. The Contractor must report to the Commissioner any condition that will prevent it from performing Work that conforms to the required Specifications.

C. Existing Utility Information: The Contractor must furnish information to the Commissioner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Additionally, the Contractor must coordinate with authorities having jurisdiction.

D. Space Requirements: The Contractor must verify space requirements and dimensions of items shown diagrammatically on the Contract Drawings.

3.8 DEFERRED CONSTRUCTION:

A. In order to permit the installation of any item or items of equipment required to be furnished and installed within the time allowed for completing the Work of the Contract, the Contractor must defer construction Work limited to adequate areas as approved and certified by the Commissioner.

B. The Contractor must confer with the affected trade Subcontractors and ascertain arrangements, time, and facilities necessary to be made by the Contractor in order to execute the provisions specified herein.

3.9 INSTALLATION:

A. General: The Contractor must locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical Work plumb and make horizontal Work level.

2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated on the Contract Drawings.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory-prepared and field-installed. Check shop drawings of other work and work of trade Subcontractors to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by the Design Consultant.

2. Allow for building movement, including thermal expansion and contraction.

3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral

anchors that are to be embedded in concrete or masonry. Deliver such items to Project Site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.10 PERMITS:

A. The Contractor must comply with all local, state and federal laws, rules, and regulations affecting the Work of this Project, including, without limitation, (1) obtaining all necessary permits for the performance of the Work prior to commencement thereof, and (2) complying with all requirements for the disposal of demolition and/or construction debris, waste, etc., including disposal in City landfills. The Contractor must be responsible for all costs in connection with such regulatory compliance, unless otherwise specified in the Contract.

3.11 TRANSPORTATION:

A. Availability: The Contractor must determine the availability of transportation facilities and dockage for the use of its employees, equipment, and materials, and the conditions under which such use will be permitted.

B. Costs: If transportation facilities and dockage are available and are permitted to be used by the governmental agency having jurisdiction, the Contractor must pay all necessary costs and expenses, and abide by all rules and regulations promulgated in connection therewith.

C. Vehicles: With respect to the use of vehicles on highways and bridges, the Contractor's attention is directed to the limitations set forth in the Rules of the City of New York, Title 34, Chapter 4, Section 4-15.

D. Continued Use: It is understood that the Commissioner makes no warranty as to the continued use by the Contractor of such facilities.

E. Trucking: All third-party trucking hired by one of the Prime Contractors or any Tier Subcontractor must be submitted as a Request for Subcontractor Approval (RFAS) as a subcontractor with the following exceptions:
1. For materials delivered by a supplier;
2. For pick-up and delivery of containers and/or dumpsters not used for soils.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.12

3.12 SLEEVES AND HANGERS:

A. Coordinate with Progress Schedule: The Contractor must promptly furnish and install conduits, outlets, piping sleeves, boxes, inserts and all other materials and equipment that is to be built into the Work in conformity with the requirements of the Project.

B. Cooperation of Subcontractors: All Subcontractors must fully cooperate with each other in connection with the performance of the above Work as "cutting in" new work is neither contemplated nor will it be tolerated.

C. Timeliness: To avoid delay, in the event that timely delivery of sleeves and other materials cannot be made, the Contractor may arrange to have boxes or other forms set at the locations where the piping or other material is to pass through or into the slabs, walls or other Work. Upon the subsequent installation of the sleeves or other material, the Contractor must fill around them with materials as required by the Contract. The necessary expenditures incurred for the boxing out and filling in must be borne by the Contractor.

D. Inserts: The Contractor is to install strip inserts four (4) foot on center and perpendicular to beams in ceiling slabs of boiler, machine, and mechanical equipment rooms. Inserts are to be installed for strippable concrete slabs only.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.13

3.13 SLEEVE AND PENETRATION DRAWINGS:

A. As soon as practicable after the commencement of Work, and when the order in which concrete for the first slabs, walls, etc. to be poured is determined, the Contractor must submit to DDC a sketch indicating the location and size of all penetrations for sleeves, ducts, etc. which will be required to accommodate the mechanical trades in order to determine if such penetrations will materially weaken the Project's structure. The sketch must be stamped and returned if approved and/or comments will be transmitted. The Contractor must continue to submit sketches as the pouring schedule and the concrete Work progresses and until approvals for the penetration sketches have been given. The Contractor must not predicate its layout Work on unapproved sketches.

3.14 CUTTING AND PATCHING:

A. Responsibility: The Contractor must do all cutting, patching, and restoration required by its Work, unless otherwise particularly specified in the Specifications.

B. Restore Work: The Contractor must restore any Work damaged during the performance of the Work.

C. Competent Workers: All restoration Work must be done to the satisfaction of the Commissioner by competent workers skilled in the trade required by such restoration. If, in the judgment of the Commissioner, workers engaged in restoration Work are incompetent, they must be replaced immediately by competent workers.

D. Structural Elements: Do not cut and patch structural elements without the prior approval, in writing, of the Commissioner.

E. Operational Elements: Do not cut and patch operating elements and related components.

F. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Commissioner's opinion, reduce the building's aesthetic qualities. The Contractor must remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

G. Existing Warranties: The Contractor must remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

H. Removals: The Contractor must remove from the premises all demolished materials of every nature or description resulting from cutting, patching, and restoration work, in accordance with the requirements hereinafter stipulated under Sub-Section 3.17 herein and as further required in Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 3.15

3.15 LOCATION OF PARTITIONS:

A. Within three (3) weeks after the concrete slabs have been poured on each floor level, the Contractor must immediately locate accurately all of the partitions, including the door openings, on the floor slabs in a manner approved by the Commissioner.

3.16 FURNITURE AND EQUIPMENT:

A. Responsibility: The Contractor is responsible for moving all loose furniture and/or equipment in all areas where the location of such furniture and/or equipment interferes with the proper performance of its Work.

B. Protection: All such furniture and/or equipment must be adequately protected with dust cloths and returned to their original locations when directed to do so by the Commissioner.

3.17 REMOVAL OF RUBBISH AND SURPLUS MATERIALS:

A. Of the waste that is generated during demolition, as many of the waste materials as economically feasible must be reused, salvaged, or recycled. Waste disposal in landfills must be minimized. Comply with requirements of Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

B. Rubbish: Rubbish must not be thrown from the windows or other parts of the Project. Mason's rubbish, dirt and other dust-producing material must be wetted down periodically.

C. Location: The Contractor must clean the Project Site and Work area daily, sweep up, and deposit at a location designated on each floor, all of its rubbish, debris, and waste materials as it accumulates or more frequently when directed by the Commissioner. Wood crating must be broken up, neatly bundled, tied, and stacked ready for removal and be deposited at a location designated on each floor.

1. Comply with requirements in NYC Fire Department for removal of combustible waste materials and debris.

2. Do not hold materials more than seven (7) Days during normal weather or three (3) Days if the temperature is expected to rise above 80 degrees F (27 degrees C).

3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

D. Laborers: Since the Contractor is responsible for the removal of all rubbish, etc., from the Site, the Contractor must employ and keep engaged for this purpose an adequate number of laborers.

E. Surplus Materials: The Contractor must remove from the Site all surplus materials when there is no further use for same.

F. Tools and Materials: At the conclusion of the Work, all erection plant, tools, temporary structures and materials belonging to the Contractor must be promptly removed.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

3.18 CLEANING:

A. The Contractor must thoroughly clean all equipment and materials furnished and installed, and must deliver such materials and equipment undamaged in a clean and new appearing condition up to date of Final Acceptance.

B. Site: Maintain Project Site free of waste materials and debris.

C. Installed Work: Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of the product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

D. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

E. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration up to date of Final Acceptance.

F. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration up to date of Final Acceptance.

3.19 SECURITY AND PROTECTION OF WORK SITE:

A. Provide protection of installed Work, including appropriate protective coverings, and maintain conditions that ensure installed Work is without damage or deterioration up to date of Final Acceptance.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

C. Secure and protect Work and Work Site against damage, loss, injury, theft and/or vandalism.

D. Maintain daily sign-in sheets of workers and visitors and make the sheets available to the Commissioner.

3.20 MAINTENANCE OF SITE AND ADJOINING PROPERTY:

A. The Contractor must take over and maintain the Project Site, after order to start Work.

B. The Contractor must be responsible for the safety of the adjoining property, including sidewalks, paving, fences, sewers, water, gas, electric and other mains, pipes and conduits etc. until the date of Final Acceptance. The Contractor must, at its own expense, except as otherwise specified, protect same and maintain them in at least as good a condition as that in which the Contractor finds them.

C. All pavements, sidewalks, roads and approaches to fire hydrants must be kept clear at all times, maintained and repaired to serviceable condition with materials to match existing.

D. Provide and keep in good repair all bridging and decking necessary to maintain vehicular and pedestrian traffic.

E. The Contractor must also remove all snow and ice as it accumulates on the sidewalks within the Contract Limits Lines.

3.21 MAINTENANCE OF PROJECT SITE:

A. The Contractor must take over and maintain all Project areas, after order to start Work.

B. Until the date of Final Acceptance, the Contractor must be responsible for the safety of all Project areas, including water, gas, electric and other mains and pipes and conduits and must, at the Contractor's own expense, except as otherwise specified, protect same and maintain them in at least as good condition as that in which the Contractor finds them.

C. All pavements, sidewalks, roads and approaches to fire hydrants must be kept clear at all times, maintained, and if damaged, repaired to serviceable conditions with materials to match existing.

D. The Contractor must keep the space for the Resident Engineer in a clean condition.

3.22 SAFETY PRECAUTIONS FOR CONTROL CIRCUITS:

A. Control circuits, the failure of which will cause a hazard to life and property, must comply with DOB Bureau of Electrical Control requirements.

3.23 OBSTRUCTIONS IN DRAINAGE LINES:

A. The Contractor must be responsible for all obstructions occurring in all drainage lines, fittings, and fixtures after the installations and cleaning of these drainage lines, fittings, and fixtures, as certified by the Resident Engineer. Roof drains must be kept clear of any and all debris. Any stoppage must be repaired immediately at the expense of the Contractor.

3.24 CORRECTION OF THE WORK

A. Subject to the terms of the Contract, the Contractor must complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Contractor must repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
   a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 73 00

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes administrative and procedural requirements for the management and disposal ofconstruction waste and includes the following requirements:
   1. Waste Management Goals
   2. Waste Management Plan
   3. Progress Reports
   4. Progress Meetings
   5. Management Plan Implementation

B. This section includes:
   1. Definitions
   2. Waste Management Performance Requirements
   3. Reference Resources
   4. Submittals
   5. Quality Assurance
   6. Waste Plan Implementation
   7. Additional Demolition and Salvage Requirements
   8. Disposal

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION
C. Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION
D. Section 01 73 00 EXECUTION
E. Section 01 77 00 CLOSEOUT PROCEDURES
F. Section 01 78 39 CONTRACT RECORD DOCUMENTS
G. Refer to the Addendum to identify whether this Project is designed to comply with a Certification Level according to the U.S. Green Building Council's LEED Rating System, as specified in Section 01 81 13.04 "SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS".

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the GeneralConditions not otherwise defined herein.

Term	**Definition**
Alternative Daily Cover (ADC)	Material other than earthen material placed on the surface of the active face of a municipal solid Waste landfill at the end of each Work Day to control vectors, fires, odors, blowing litter and scavenging.
Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the Design Consultant may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
Clean	Untreated and unpainted; not contaminated with oils, solvents, caulk or the like.
Construction and Demolition (C&D) Waste	Solid Wastes typically including building materials, trash debris and rubble resulting from remodeling, repair and demolition operations. Hazardous materials and land clearing Waste are not included.
Diversion from Landfill	Material removal from the Site for Recycling, Reuse or Salvage that might otherwise be sent to a landfill.
Off-site Sorting	Material types that are combined on the project site and hauled away for sorting. Measured weights only. Approximations of weight or volume based on visual inspection are not acceptable. a. Off-site Sorting Method 1: Diversion Rate derived from the weight of the individual diverted material type divided by the weight of the commingled waste. Individual diverted material types handled through this sorting method are each counted as an individual diverted material type. b. Off-site Sorting Method 2: Diversion Rate derived from the waste sorting facility average diversion rate, multiplied by the weight of the commingled waste. All diverted materials handled through this sorting method are counted as a single diverted material type.
On-site Sorting	Material types that have been sorted in segregated containers or project areas for removal as segregated diverted material types. Measured weights only. Approximations of weight or volume based on visual inspection are not acceptable. a. On-site Sorting: Diversion Rate derived from the weight of the diverted material type. Material diverted through this sorting method are each counted as an individual diverted material type.
Recyclable	The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product.
Recycle (recycling)	To sort, separate, process, treat or reconstitute solid Waste and other discarded materials for the purpose of redirecting such materials into the manufacture of useful products. Recycling does not include burning, incinerating or thermally destroying Waste.
Return	To give back Reusable items or unused products to vendors.

Reuse	To reuse excess or discarded construction material in some manner on the Project Site.
Salvage	To remove a Waste material from the Project Site for resale or reuse.
Waste	Extra material or material that has reached the end of its useful life in its intended use. Waste includes Salvageable, Returnable, Recyclable and Reusable material.
Waste Management Plan	A Project-related plan for the collection, transportation and disposal of Waste generated at the construction Site. The purpose of the plan is to ultimately reduce the amount of material becoming landfill.
Waste-to-Energy	The conversion of non-Recyclable Waste materials into usable heat, electricity or fuel through a variety of processes, including combustion, gasification, pyrolization, anaerobic digestion and landfill gas recovery.

1.5 WASTE MANAGEMENT PERFORMANCE REQUIREMENTS:

A. The City of New York has established that this Project must generate the least amount of Waste possible and employ processes that ensure the generation of as little Waste as possible due to error, inaccurate planning, breakage, mishandling, contamination, or other factors.

B. Of the Waste that is generated during demolition, as many of the Waste materials as economically feasible, and as stated here, must be Reused, Salvaged, or Recycled. Waste disposal in landfills must be minimized.

REFER TO THE ADDENDUM FOR THE APPLICABILITY OF SUB-SECTION 1.5 C

C. LEED CERTIFICATION: The City of New York will seek Leadership in Energy and Environmental Design (LEED) certification for this Project as indicated in the Addendum to the General Conditions from the U.S. Green Building Council. The documentation required here will be used for this purpose. LEED awards points for a variety of sustainable design measures on a project, one of which is the Reuse and Recycling of project Waste.

D. DIVERSION REQUIREMENTS. With the exception of LEED v4 projects with demolition ADC Waste, a minimum of seventy-five percent (75%) of total Project demolition and construction Waste (by weight) must be diverted from landfill through at least four (4) diverted material types. LEED v4 projects with demolition ADC Waste must divert a minimum of fifty percent (50%) of total Project demolition and construction Waste (by weight) from landfill through at least three (3) diverted material types. The following Waste categories are likely candidates to be included in the diversion plan as applicable for this Project:

1. Concrete;
2. Bricks;
3. Concrete masonry units (CMU);
4. Asphalt;
5. Metals (e.g. banding, stud trim, ceiling grid, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, brass, bronze);
6. Clean dimensional wood;

7. Carpet and pad;
8. Drywall;
9. Ceiling tiles;
10. Cardboard, paper and packaging; and
11. Reuse items indicated on the Contract Drawings and/or elsewhere in the Specification.

E. All fluorescent lamps, High Intensity Discharge lamps and mercury-containing thermostats removed from the Site must be Recycled. Do not use bulb crusher on Site.

F. Recycling on the job, subject to the Commissioner's approval, is encouraged on the Site itself, such as the crushing and reuse of removed sound concrete and stone. Include these categories in the Waste Management Plan.

G. Land-clearing debris is not considered construction, demolition or renovation Waste and is not to be included as contribution to Waste diversion.

H. A minimum of five (5) material types, both structural and nonstructural, are to be identified in the Construction Waste Management Plan for diversion.

I. For LEED v4 projects, material to be used as ADC does not qualify as material diverted from disposal.

1.6 REFERENCES, RESOURCES:

A. DDC encourages its Contractors to seek information from websites and experts in Salvage or Recycling inorder to minimize disposal costs. There are numerous opportunities to sell, Salvage, or to donate materials and accrue tax benefits (which would accrue to the Contractor responsible for removal); there are also outlets that will pick up, and in some cases, buy Recyclable materials. Examples of information resources are as follows:

1. A standard Construction and Demolition (C&D) Waste Management Log form is available through DDC's Sustainable Design website: https://www1.nyc.gov/assets/ddc/downloads/Sustainable/forms-local-law-86/waste-tracking-form.pdf.
2. Web Resources (information only; no warranty or endorsement is implied):
   a. www1.nyc.gov/assets/donate/site/ – Website of donateNYC, a network of nonprofit organizations in New York City that accept and distribute second-hand and surplus goods.
   b. www.bignyc.org – Website of Build It Green NYC, a non-profit outlet for Salvaged and surplus building materials.
   c. www.usgbc.org – Website of the United States Green Building Council, with a description of the LEED certification process and requirements for C&D Waste Recycling.
   d. www.epa.gov/smm/sustainable-management-construction-and-demolition-materials– Website of the U.S. Environmental ProtectionAgency (EPA) that discusses C&D Waste issues, and links to other resources.
3. Waste-to-Energy Facilities that need to comply with European Standard (EN) for Waste management and emissions into air, soil, surface water and groundwater:
   a. www.ec.europa.eu/environment/waste/framework/index.htm – European Commission Waste Framework Directive 2008/98/EC.
   b. https://eur-lex.europa.eu/homepage.html - European Commission Waste

Incineration Directive 2000/76/EC.

c. www.cen.eu/cen/Products – EN Standards 303-1, 303-2, 303-3, 303-4, 303-5, 303-6, 303-7.

1.7 SUBMITTALS:

A. The Contractor must refer to Section 01 33 00 SUBMITTAL PROCEDURES for submittal requirements.

B. The Contractor must be responsible for the development and implementation of a Waste Management Plan for the Project. The Contractor's Subcontractors must assist in the development of that Plan, and collect and deposit their Waste and Recyclable materials in accordance with the approved Plan.

C. Draft Waste Management Plan: Within fifteen (15) Days after receipt of the Notice to Proceed (NTP), or prior to any Waste removal, whichever occurs sooner, the Contractor must submit to the Commissioner a Draft Waste Management Plan. Include separate sections for C&D Waste. The Plan must demonstrate how the performance goals will be met, and contain the following:

1. List of material types targeted for Reuse, Salvage, or Recycling, and names, addresses, and phone numbers of receiving facilities/companies that will be purchasing or accepting each material. Each material listed is to include estimated amount in tons and percentage of overall construction waste of each of the material steams.
2. Estimation of the percentage of overall construction waste that will be sent to landfill.
3. Description of on-Site and/or off-Site sorting methods for all materials to be removed from Site. Off-site sorting methods must be categorized as Off-site Sorting Method 1 or Off-site Sorting Method 2.
4. If mixed C&D Waste is to be sorted off-Site, provide a letter from the processor stating the average percentage of mixed C&D Waste they Recycle. Waste processor's average percentage of mixed C&D waste must not include Alternative Daily Cover as a recycled material for LEED v4 projects.
5. Landfill information: Names of landfills where non-Recyclable/reusable/salvageable Waste will be disposed, and list of applicable tipping fees.
6. Material handling procedures: Specify whether materials must be separated or commingled and describe the planned diversion strategies. Describe expected amount of each material type, where materials must be taken and how the Recycling facility must process the material. Provide a description of the means by which any Recyclable, Salvaged, or Reused materials will be protected from contamination and collected in a manner that will meet the requirements for acceptance by the designated Recycling processors.
7. Transportation: A description of the means of transportation and destination for Recycled materials.
8. Meetings: Regular meetings must be held monthly, or as directed by the Commissioner, and the Contractor must provide a description of these meetings to address Waste management.
9. Sample spreadsheet and description of how the implementation of the Plan will be documented and submitted on a monthly basis.

D. Final Waste Management Plan: Within fifteen (15) Days of Commissioner's approval of the Draft Waste Management Plan, the Contractor must submit a Final Waste Management Plan.

E. Progress Reports: The Contractor must submit a monthly Waste Management Progress Report, containing the following information:

1. Project title, name of company completing report, and dates of period covered by the report.
2. Report on the disposal of all Project Site Waste. A DDC C&D Waste Management Log form is included at the end of this section. For each shipment of material removed from the Site, provide the following:
   a. Date and ticket number of removal;
   b. Identity of material hauler;
   c. Material type;
   d. Waste sorting method;
   e. Total quantity of Waste, in tons/cubic yards, by type;
   f. Quantity of Waste Salvaged, Recycled and/or Reused, by type;
   g. Total quantity of Waste diverted from landfill (Recycled, Salvaged, Reused) as a percentage of total Waste; and
   h. Recipient of each material type.
3. Provide monthly and cumulative Project totals of Waste, quantity diverted, and percentage diverted.
4. Note that the unit of measurement may be either tons or cubic yards but must be consistent for all shipments and all materials throughout the Project. Reports with inconsistent or mixed units will not be reviewed and will be Returned for re-submission.
5. Include legible copies of on-Site logs, weight tickets and receipts. Receipts must be from charitable organizations, Recycling and/or disposal site operators who can legally accept the materials for the purpose of reuse, Recycling or disposal. Contractor must save such original documents for the life of the Project plus seven (7) years.

F. LEED Submittal: For LEED-designated projects, submit final LEED construction Waste report signed by the Contractor, tabulating total Waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met. Waste report must include:
   1. At least four (4) material streams for diverted materials;
   2. Documentation of Recycling rates for commingled facilities; and
   3. For Waste-to-Energy strategy, submit documentation of facility adherence to relevant EN standards, and justification for the strategy.

G. Refrigerant Recovery: Where refrigerant is recovered, submit statement of refrigerant recovery, which must include:
   1. Name, address, qualification data and signature of the refrigerant recovery technician responsible for recovering refrigerant;
   2. Statement that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations; and
   3. Date refrigerant was recovered.

1.8 QUALITY ASSURANCE:

A. The Contractor must designate a Construction Waste Management Representative to ensure compliance with this section. The Representative must be present at the Project Site full-time and for the duration of the Project.

B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Waste Management Plans, documentation, and implementation must be discussed at the following meetings:

1. Pre-demolition kick-off meeting;
2. Pre-construction kick-off meeting;
3. Regular job-site meetings; and
4. Contractor toolbox meetings.

E. For LEED v4 projects, Waste-to-Energy Facilities: Comply with EN standards for Waste management and emissions into air, soil, surface water, and groundwater.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

3.1 WASTE PLAN IMPLEMENTATION:

A. Prior to the demolition and construction start, the Contractor must implement the Waste Management Plan, coordinate the Plan with all affected trades, and designate one individual as the Construction Waste Management Representative. The Representative will be responsible for communicating the progress of the Plan with the Commissioner on a regular basis and for assembling the required LEED documentation.

B. The Contractor must be responsible for the provision of containers and the removal of all Waste, non-Returned surplus materials and rubbish from the Site in accordance with the approved Waste Management Plan. The Contractor must oversee and document the results of the Plan. Monies received for Salvaged materials must remain with the Contractor, except the monies for those items specifically identified elsewhere in the specifications or indicated on the Contract Drawings as belonging to others.

C. Responsibilities of Subcontractors: Each Subcontractor must be responsible for collecting its Waste, non-Returned surplus materials and rubbish, in accordance with the Waste Management Plan.

D. Distribution: The Contractor must distribute copies of the Waste Management Plan to each Subcontractor,Resident Engineer, Construction Manager, and the Commissioner.

E. Instruction: The Contractor must provide on-Site instruction of proper Waste management procedures to be used by all parties at appropriate stages of the Project.

F. Procedures: Conduct Waste management operations to ensure minimum interference with Site vegetation, roads, streets, walkways and other adjacent, occupied, and used facilities. The waste management operations include, but are not limited to:

1. Collect commingled Waste and/or separate all Recyclable Waste in accordance with the Plan. Specific areas on the Project Site are to be designated, and appropriate containers and bins clearly marked with acceptable and unacceptable materials.
2. Inspect containers and bins for contamination and remove contaminated materials if found. Comply with requirements in the following General Conditions sections for controlling dust

and dirt, environmental protection, and noise control: Section 01 81 19 - INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS, Section 01 81 13.04 - SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS, Section 01 10 00 – SUMMARY, Section 01 35 26 - SAFETY REQUIREMENTS PROCEDURES, Section 01 50 00 - TEMPORARY FACILITIES, SERVICES AND CONTROLS, and Section 01 73 00 – EXECUTION..

3.2 ADDITIONAL DEMOLITION AND SALVAGE REQUIREMENTS:

A. Demolition and Salvage of additional items indicated in other sections of the Project Specifications require special attention as part of the overall seventy-five percent (75%) Diversion from Landfill. Specific requirements for special attention are designated in other sections of the Project Specifications.

3.3 DISPOSAL:

A. General: Except for items or material to be Salvaged, Recycled, or otherwise Reused, remove Waste material from the Project Site and legally dispose of them in a manner acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow Waste materials that are to be disposed of to accumulate on Site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn Waste materials.

C. Disposal: Transport Waste materials off Project Site and legally dispose of them.

END OF SECTION 01 74 19

Department of Design and Construction

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT LOG

Project Name: _____
Project I.D.: _____

Contractor: _____
Prepared by: _____
For Month: _____

Haul Date	Ticket #	Hauling Company	*Material Type[2]	Sorting Method[5]	Material Quantity (tons or cubic yards)[1]				*Material Recipient
					*Total Weight	Excluded Material[3]	*Diverted Material[4]	*Landfilled Material	
					*Total		*Diverted	*Landfilled	
				Monthly Totals					
				% Diverted this Month*					
				Cumulative Totals					
				% Diverted to Date					

Notes:

1. Volume (cubic yards) may be used instead of weight if used for ALL amounts and ALL materials.
2. Includes concrete; bricks; concrete masonry units (CMU); asphalt; metals; clean dimensional wood; carpet and pad; drywall; ceiling tiles; cardboard, paper, and packaging; and any other Reuse items indicated on the Contract Drawings and/or elsewhere in the Specifications.
3. Excluded material includes soil or land clearing debris and for LEED v4 projects, Alternative Daily Cover (ADC) such as screen fines and 6” minus.
4. Diverted material includes Recycled and Reused material diverted from landfill. Recycled material is reprocessed into new products. Reused material is reclaimed, Salvaged or otherwise used in its original form, either on-site or off-site.
5. Sorting Method must be classified as On-Site Sorted, Off-Site Sorted Method 1, or Off-Site Sorted Method 2.

* These items must be listed in order to receive LEED credit.

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes administrative and general procedural requirements for Closeout Procedures, including, without limitation, the following:

1. Definitions
2. Substantial Completion
3. Final Acceptance
4. Warranties
5. Final Cleaning

B. LEED: Refer to the Addendum to identify whether this Project is designed to comply with a Certification Level according to the U.S. Green Building Council's (USGBC) Leadership in Energy & Environmental Design (LEED) Rating System, as specified in Section 01 81 13.04 “SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS”.

C. COMMISSIONING: Refer to the Addendum to identify whether this Project will be commissioned by an independent third party under separate contract with the City of New York. Commissioning must be in accordance with ASHRAE and USGBC LEED- NC procedures, as described in Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS and Section 01 91 15 GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE. The Contractor must cooperate with the Commissioning Agent and provide whatever assistance is required.

1.3 RELATED SECTIONS: include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 33 00 SUBMITTAL PROCEDURES
C. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
D. Section 01 78 39 CONTRACT RECORD DOCUMENTS
E. Section 01 79 00 DEMONSTRATION AND OWNER’S PRE-ACCEPTANCE ORIENTATION

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	Definition
Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the Design Consultant may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.5 SUBSTANTIAL COMPLETION:

A. Preliminary Procedures: Before requesting inspection to determine the date of Substantial Completion, the Contractor must complete and supply all items required by the Contract Specifications, General Conditions, Addendum to the General Conditions, change orders or other directives from the Commissioner's representatives. The required items will include all Contract requirements for Substantial Completion, including, but not limited to, items related to releases, regulatory approvals, warranties and guarantees, record documents, testing, demonstration and orientation, final clean up and repairs, and all specific checklist of items by the Resident Engineer. (See Attachment "A" at the end of this section for sample requirements for Substantial Completion).

B. The Contractor must prepare and submit a list to the Resident Engineer of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

C. Inspection: The Contractor must submit to the Resident Engineer a written request for inspection for Substantial Completion. Within ten (10) Days of receipt of the request, the Resident Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. The Resident Engineer may request the services, as required, of the Design Consultant, client agency representative and/or other entities having involvement with the Work to assist in the inspection of the Work. If the Resident Engineer makes a determination that the Work is Substantially Complete and approves the Final Approved Punch List and the date for Final Acceptance, he/she will so advise the Commissioner and recommend issuance of the Certificate of Substantial Completion. If the Resident Engineer determines that the Work is not substantially complete, he/she will notify the Contractor of those items that must be completed or corrected before the Certificate of Substantial Completion will be issued.

1 Re-inspection: Contractor must request re-inspection when the Work identified in previous inspections as incomplete are completed or corrected.
2 Results of completed inspection will form the basis of the requirements for Final Acceptance.

1.6 FINAL ACCEPTANCE:

A. Preliminary Procedures: Before requesting final inspection for Final Acceptance of the Work, the Contractor must complete the following. (Note that the following are to be completed, submitted as appropriate, and approved by the Commissioner, as applicable, prior to the final inspection and are not to be submitted for approval or otherwise at the final inspection unless specifically indicated). List exceptions in the request.

1. Verify that all required submittals have been provided to the Commissioner including, but not limited to, the following:

   a. Manufacturer's cleaning instructions;

   b. Posted instructions;

   c. As-built Contract Documents (Drawings, Specifications, and product data) as described in Section 01 78 39 CONTRACT RECORD DOCUMENTS, incorporating any changes required

by the Commissioner as a result of the review of the submission prior to the pre-final inspection;

d. Operation and maintenance manuals, including preventive maintenance, special tools, repair requirements, parts list, spare parts list, and operating instructions;

e. Completion of required demonstration and orientation, as applicable, of designated personnel in operation and maintenance of systems, sub-systems and equipment;

f. Applicable LEED Building submittals as described in Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS; and

g. Construction progress photographs as described in Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION.

2. Submit a certified copy of the Final Approved Punch List of items to be completed or corrected. The certified copy of the Punch List must state that each item has been completed or otherwise resolved for acceptance, and must be endorsed and dated by the Contractor.

3. Submit pest-control final inspection report and survey as required in Section 01 50 00 TEMPORARY FACILITIES AND CONTROLS.

4. Submit record documents and similar final record information.

5. Deliver tools and similar items.

6. Complete final clean-up requirements including touch-up painting of marred surfaces.

7. Submit final meter readings for utilities, as applicable, a measured record of stored fuel, and similar data as of the date when the City took possession of and assumed responsibility for corresponding elements of the Work.

B. Final Inspection: The Contractor must submit to the Resident Engineer a written request for inspection for Final Acceptance of the Work. Within ten (10) Days of receipt of the request, the Resident Engineer will either proceed with inspection or notify the Contractor of unfulfilled requirements. The Resident Engineer may request the services, as required, of the Design Consultant, client agency representative and/or other entities having involvement with the Work to assist in the inspection of the Work. If the Resident Engineer finds that all items on the Final Approved Punch List are complete and no further Work remains to be done, he/she will so advise the Commissioner and recommend the issuance of the determination of Final Acceptance. If the Resident Engineer determines that the Work is not complete, the Resident Engineer will notify the Contractor of those items that must be completed or corrected before the determination of Final Acceptance will be issued.

C. Final Acceptance: The Work will be accepted as final and complete as of the date of the Resident Engineer's inspection if, upon such inspection, the Resident Engineer finds that all items on the Final Approved Punch List are complete and no further Work remains to be done. The Commissioner will then issue a written determination of Final Acceptance.

1.7 WARRANTIES:

A. Schedule B of the Addendum lists the items of materials and/or equipment for which manufacturer warranties are required. For each item of material and/or equipment listed in Schedule B, the Contractor must obtain a written warranty from the manufacturer. Such warranty must provide that the material or equipment is free from defects for the period set forth in Schedule B and will be replaced or repaired within such specified period. The Contractor must deliver all required warranties to the Commissioner.

B. Unless indicated otherwise, warranties are to take effect on the date of Substantial Completion.

C. Submittal Time: Submit written warranties on request of the Commissioner for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

D. Partial Occupancy: Submit properly executed warranties to the Commissioner within fifteen (15) Days of completion of designated portions of the Work that are completed and occupied or used by the City.

E. Organize the warranty documents into an orderly sequence based on the Project Specification Divisions and Section Numbers.

1. Bind warranties in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES"; name and location of Project; Capitol Budget Project Number (FMS ID); and Contractor's and applicable Subcontractor's name and address.
3. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation.
4. Provide a typed description of each product or installation being warranted, including the name of the product, and the name, address, and telephone number of the installer.

F. When warranted materials and/or equipment require operation and maintenance manuals, provide additional copies of each required warranty in each required manual. Refer to Section 01 78 39 CONTRACT RECORD DOCUMENTS, for requirements of operation and maintenance manuals.

PART II – PRODUCTS

2.1 MATERIALS:

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART III – EXECUTION

3.1 FINAL CLEANING:

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations, as applicable, before requesting inspection for Final Acceptance of the Work for the entire Project or for a portion of the Project:

a. Clean Project Site, yard, and grounds in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

d. Remove tools, construction equipment, machinery, and surplus material from Project Site.

e. Remove snow and ice to provide safe access to building.

f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

h. Sweep concrete floors broom clean in unoccupied spaces.

i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.

j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

k. Remove labels that are not permanent.

l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

n. Replace parts subject to unusual operating conditions.

o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

q. Clean ducts, blowers, and coils if units were operated without filters during construction.

r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

s. Leave Project clean and ready for occupancy.

t. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests, as required in Section 01 50 00 TEMPORARY FACILITIES, SERVICES AND CONTROLS. Prepare and submit a pest control report to the Commissioner.

D. Comply with all applicable safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on City's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project Site and dispose of lawfully.

END OF SECTION 01 77 00

SECTION 01 77 00

ATTACHMENT 'A'

The following list is a general sample of Substantial Completion requirements, including, but not limited to:

1. Prepare and submit a list to the Resident Engineer of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
2. Obtain and submit any necessary releases enabling the City unrestricted use of the Project and access to services and utilities.
3. Regulatory Approvals: Submit all required documentation from applicable governing authorities, including, but not limited to, the New York City Department of Buildings (DOB); Department of Transportation (DOT); Department of Environmental Protection (DEP); Fire Department (FDNY); etc. Documentation includes, but is not limited to, the following:
   a. Building permits, applications and sign-offs;
   b. Permits and sign-off for construction fences; sidewalk bridges; scaffolds, cranes and derricks; utilities; etc.;
   c. Certificates of inspections and sign-offs;
   d. Required certificates and use permits; and
   e. Certificate of Occupancy (C.O.), Temporary Certificate of Occupancy (T.C.O.) or Letter of Completion as applicable.
4. Submit specific warranties required by the Specifications, final certifications, and similar documents.
5. Prepare and submit Contract Documents as described in Section 01 78 39, CONTRACT RECORD DOCUMENTS, including but not limited to:
   a. Approved documentation from governing authorities;
   b. As-built record drawings and Specifications; product data; operation and maintenance manuals;
   c. Final Completion construction photographs;
   d. Damage or settlement surveys;
   e. Final property surveys; and
   f. Similar final record information.
   g. The Resident Engineer will review the submission and provide appropriate comments. If comments are significant, the initial submission will be returned to the Contractor for correction and re-submission incorporating the comments prior to the Final Inspection.
6. Record Waste Management Progress Report: Submit Construction & Demolition (C&D) Waste Management logs, with legible copies of weight tickets and receipts required in accordance with Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
7. If applicable submit LEED letter template in accordance with the requirements of Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS.
8. Schedule applicable demonstration and orientation required in other sections of the Project Specifications and as described in Section 01 79 00 DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION.

9. Deliver tools and similar items to location designated by Resident Engineer. Label with manufacturer's name and model number where applicable.
10. Make final changeover of permanent locks and deliver keys to the Resident Engineer. Advise Commissioner of changeover in security provisions.
11. Complete startup testing of systems as applicable.
12. Submit approved test/adjust/balance records.
13. Terminate and remove temporary facilities from Project Site, along with mockups, construction tools, and similar elements as directed by the Resident Engineer.
14. If applicable, complete Commissioning requirements as defined in Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS and/ or Section 01 91 15 BUILDING ENCLOSURE COMMISSIONNING REQUIREMENTS.
15. Complete final cleaning requirements, including touchup painting.
16. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

SECTION 01 78 39
CONTRACT RECORD DOCUMENTS

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes administrative and general procedural requirements for Contract Record Documents, including:

1. Contract Record Drawings
2. Record Specifications, Addenda and Change Orders
3. Record Product Data
4. Record Sample Submittal
5. Construction Record Photographs
6. Operating and Maintenance Manuals
7. Final Site Survey
8. Demonstration and Orientation DVD
9. Guarantees and Warranties
10. Waste Disposal Documentation
11. LEED Materials and Matrix
12. Miscellaneous Record Submittals

B. The Department of Design and Construction (DDC), at the start of construction (kick-off meeting), will furnish to the Contractor, at no cost, a complete set of Contract Record Drawings (PDF set) pertaining to the Work to be performed under the Contract. It is the responsibility of the Contractor to modify the Contract Drawings to indicate all changes and corrections, if any, occurring in the Work as actually installed. The Contractor is required to furnish all other drawings, if necessary, such as Addenda Drawings and Supplementary Drawings as may be necessary to indicate all Work in detail as actually completed. <u>All professional seals must be blocked out</u>. Title box complete with Project title and Design Consultants' names will remain.

C. Maintenance of Documents and Samples: The Contractor must maintain, during the progress of the Work, an accurate record of the Work as actually installed, on Contract Record Drawings (PDF set). Store Contract Record Documents and samples in the field office apart from the Contract Documents used for construction. Do not use Contract Record Documents for construction purposes. Maintain Contract Record Documents in good order and in a clean, dry, legible condition. Make documents and samples available at all times for the Resident Engineer's inspections.

1. The Contractor's attention is particularly directed to the necessity of keeping accurate records of all subsurface and concealed Work, so that the Contract Record Drawings contain this information in exact detail and location. Contract Record Drawings must also show all connections, valves, gates, switches, cut-outs and similar operating equipment.

2. For projects designated to achieve a Leadership in Energy and Environmental Design (LEED) rating, the Contractor will receive a copy of the Project's LEED scorecard for the purpose of monitoring compliance with the target objectives and to facilitate coordination with the LEED Consultant. The Contractor will receive periodic updates of this scorecard and is required to submit the final version of the Scorecard at Substantial Completion with other Project Record Documents.

1.3 RELATED SECTIONS: include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION
C. Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION
D. Section 01 33 00 SUBMITTAL PROCEDURES
E. Section 01 77 00 PROJECT CLOSEOUT PROCEDURES

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	**Definition**
Commissioning Authority / Commissioning Agent (CxA)	The entity responsible for providing commissioning services for the Project. The entity serving as the CxA may be either an employee(s) of the City or an entity engaged by the City to provide such services.
Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the Design Consultant may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
LEED Consultant	The entity responsible for providing LEED sustainability services for the Project. The entity serving as the LEED Consultant may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.5 SUBMITTALS:

A. As-Built Contract Record Drawings: The Contractor must comply with the following:

1. Progress Submission: As directed by the Resident Engineer, submit progress as-built Contract Record Drawings at the fifty percent (50%) construction completion stage.

2. Final Submission: Before Substantial Completion payment, the Contractor must furnish to the Commissioner one (1) complete set of marked-up as-built Contract Record Drawings, in PDF indicating all of the Work and locations as actually installed.

3. As-built Contract Record Drawings must be of the same size as that of the Contract Drawings, with a one (1) inch margin on three (3) sides and a two (2) inch margin on the left side for binding.

4. Each as-built Contract Record Drawing must bear the legend "AS-BUILT CONTRACT RECORD DRAWING" in heavy block lettering, one half (l/2) inch high, and contain the following data:

AS-BUILT CONTRACT RECORD DRAWING

Contractor's Name		_____
Contractor's Address		_____
Subcontractor's Name (where applicable)		_____
Subcontractor's Address		_____
Made by:	Date	_____
Checked by:	Date	_____

Commissioner's Representatives	
(Resident Engineer)	DDC
(Plumbing Inspector)	DDC
(Heating & Ventilating Inspector)	DDC
(Electrical Inspector)	DDC

5. Contract Record Drawing Title Sheet: The Contractor must prepare a title sheet, the same size as the Contract Record Drawings, which must contain the following:

   a. Heading:
      The City of New York
      Department of Design and Construction
      Division of Public Buildings
   b. Capital Budget Project Number (FMS ID)
   c. Name and Location of Project
   d. Contractor's Name and Address
   e. Subcontractor's Name and Address (where applicable)
   f. Record of changes (a caption description of work affected, and the date and number of change order or other authorization)
   g. List of Record Drawings

B. Record Specifications, Addenda and Change Order: Submit to the Commissioner two (2) copies each of marked-up Record Specifications, Addenda and change orders.

C. Record Product Data: Submit to the Commissioner two (2) sets of Record Product Data.

D. Record Construction Photographs: Submit to the Commissioner final as-built construction photographs and digital files of the completed Work as described in Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION.

E. Operating and Maintenance Manuals:

   1. Submit three (3) copies each of preliminary manuals to the Resident Engineer for review and approval. The Contractor must make such corrections, changes and/or additions to the manual until deemed satisfactory by the Resident Engineer. Deliver three (3) copies of the final approved manuals to the Resident Engineer for distribution.

   2. Commissioning: Comply with the requirements of Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS and 01 91 15 GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE, as well as the requirements set forth in sections of the Project Specifications, for projects designated for commissioning. Submit four (4) copies each of data designated to be included in the commissioning operation and maintenance manual to the Resident Engineer. The Resident Engineer will forward such data to the Commissioning Authority/Agent (CxA) for review and comment. The Contractor must make such corrections, changes and/or additions to the data until deemed satisfactory and deliver four (4) copies of the final data to the Resident Engineer for use by the CxA to prepare the commissioning operation and maintenance manual.

a. Non-Commissioning Data: All remaining data not designated for commissioning and required as part of maintenance and operation manual must be prepared and assembled in accordance with the requirements of this section for operating and maintenance manuals.

F. Final Site Survey: Submit Final Site survey as described in Section 01 73 00, EXECUTION, in quantities requested by the Commissioner, signed and sealed by a Land Surveyor licensed in the State of New York.

G. Guarantees and Warranties.

H. Waste Disposal Documents and Miscellaneous Record Documents.

PART II – PRODUCTS

2.1 CONTRACT RECORD DRAWINGS:

A. Record Prints: The Contractor must maintain one (1) set of blue- or black-line white prints as applicable of the Contract Record Drawings and Shop Drawings. If applicable, the Contract Record Drawings and Shop Drawings must incorporate the arrangement of the Work based on the accepted master coordination drawing(s) as described in Section 01 33 00, SUBMITTAL PROCEDURES.

1. Preparation: The Contractor must mark record drawings to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is installer, Subcontractor, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an understandable drawing technique.
c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Change Orders: All changes from Contract Drawings must be distinctly encircled and identified by change order number correlating to changes listed on the "Title Sheet." The Contractor must show within the encircled areas the work as actually installed.

B. Content: Types of items requiring marking include, but are not limited to, the following:

1. Dimensional changes to Contract Record Drawings;
2. Revisions to details shown on Contract Record Drawings;
3. Depths of foundations below first floor;
4. Locations and depths of underground utilities;
5. Revisions to routing of piping and conduits;
6. Revisions to electrical circuitry;
7. Actual equipment locations;
8. Duct size and routing;
9. Locations of concealed internal utilities;
10. Changes made by change order;
11. Changes made following Commissioner’s written orders;
12. Details not on the original Contract Drawings;
13. Field records for variable and concealed conditions; and
14. Record information on the Work that is shown only schematically.

C. Progress Record Prints: As directed by the Resident Engineer, at fifty percent (50%) construction completion, review marked-up Record Prints with the Resident Engineer and the Design Consultant. When directed by the Resident Engineer, transfer progress mark-ups to a PDF set and submit to the Resident Engineer.

D. Final Contract Record Prints: Immediately before final inspection for the Certificate of Substantial Completion, review marked-up record prints with the Resident Engineer and the Design Consultant. When authorized, complete mark-up of a full set of corrected PDF prints of the Contract Drawings.

1. Incorporate changes and additional information previously marked on Record Prints. Erase, redraw, and add details and notations where applicable.
2. Refer instances of uncertainty to Resident Engineer for resolution.
3. Submit the as-built Contract Record Drawings and Shop Drawings for use as record prints as described in Sub-Section 1.5.

2.2 RECORD SPECIFICATIONS, ADDENDA AND CHANGE ORDERS:

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, Addenda, and Contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record product data has been submitted in operation and maintenance manuals instead of submitted as record product data.
5. Note related change orders and Contract Record Drawings where applicable.
6. Upon completion of mark-up, submit two (2) complete copies of the marked-up record Specifications to the Commissioner.

2.3 RECORD PRODUCT DATA:

A. Preparation: Mark product data to indicate the actual product installation where installation varies substantially from that indicated in product data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project Site and changes in manufacturer's written instructions for installation.
3. If possible, a change order proposal should include resubmitting updated product data. This eliminates the need to mark up the previous submittal.
4. Note related change orders and Contract Record Drawings where applicable.
5. Upon completion of mark-up, submit to the Commissioner two (2) sets of the marked-up record product data.
6. Where record product data is required as part of maintenance manuals, submit marked-up product data as an insert in the manual instead of submittal as record product data.

2.4 RECORD SAMPLE SUBMITTAL:

A. Prior to the date of Substantial Completion, the Contractor must meet with the Resident Engineer at the Site to determine which of the samples maintained during the construction period must be transmitted to the Commissioner for record purposes.

B. Comply with the Resident Engineer's instructions for packaging, identification marking, and delivery to DDC. Dispose of other samples as specified for disposal of surplus and waste material.

2.5 CONSTRUCTION RECORD PHOTOGRAPHS:

A. The Contractor must submit the final completion construction photographs, in compliance with Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION.

2.6 OPERATING AND MAINTENANCE MANUALS:

A. The Contractor must provide preliminary and final versions of operating and maintenance manuals required for those systems, equipment, and materials listed in other Sections of the Project Specifications.

B. Format: Prepare and assemble operation and maintenance manuals in heavy-duty, 3-ring, hardback loose leaf binders in the form of an instructional manual. All binders for each discipline must be the same color. When multiple binders are used, correlate data into related consistent groupings. Binder front must contain permanently attached labels displaying the following:

1. Heading:
   The City of New York
   Department of Design and Construction
   Division of Public Buildings
2. Capital Budget Project Number (FMS ID)
3. Name and Location of Project
4. Contractor's Name and Address
5. Subcontractor's Name and Address (where applicable)
6. Dates of the Work covered by the contents of the Project Manual.
7. Binder spine must display Project Number (FMS ID) and date of completion.

C. Organization: Include a section in the directory for each of the following:

1. List of documents
2. List of systems
3. List of equipment
4. Table of contents

D. Each manual must contain the following materials, in the order listed:

1. Title page
2. Table of contents
3. Manual contents

E. Arrange contents alphabetically by system, subsystem, and equipment. Cross-reference Specification Section numbers. Provide tabbed flyleaf for each separate product, equipment and/or system/subsystem with typed description of product and major component parts of equipment.

F. Safety warnings or cautions must be visibly highlighted within each maintenance procedure. Use of such highlights must be limited to only critical items and must not be used in an excessive manner which would reduce their effectiveness.

G. For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts. Vendors and supplier listings are to include names, addresses and telephone numbers, including nearest field service telephone numbers.

H. Where contents of the manual include any manufacturer's catalog pages, clearly indicate the precise items and options included in the installation and delete all manufacturers' data regarding products not included in the installation.

I. All material within manuals must be new. Copies used for prior submittals or used in construction must not be used.

J. Submit preliminary and final manual editions to the Commissioner according to the approved progress schedule.

K. Manuals must present all technical material to the greatest extent possible, with respect to text, tabular matter and illustrations. Illustrations must preferably consist of line drawings. All applicable drawings must be included. If available, color photograph prints may be included.

L. Preliminary manual editions must be as technically complete as the final manual edition. All illustrations must be in final forms.

M. Final manual editions must be technically accurate and complete and must represent all “as-built” systems, pieces of equipment, or materials, which have been accepted by the Commissioner. All illustrations, text and tabular material must be in final form. All shop drawings must be included as specified in individual Specification Sections.

N. Building products, applied materials, and finishes: Include product data, with catalog number, size, composition, and color texture designations. Where applicable, provide information for re-ordering custom manufactured products.

O. Instructions for care and maintenance: Include manufacturers’ recommendations for cleaning agents and methods, and recommended schedule for cleaning and maintenance.

P. Moisture protection and weather exposed products: Include product data listing applicable reference standards, chemical compositions, and details of installation. Provide recommendations for inspections, maintenance, and repair.

Q. Additional requirements: Specified in individual Specification Sections.

2.7 FINAL SITE SURVEY

A. The Contractor must submit the final certification and final survey in compliance with Section 01 73 00 EXECUTION.

2.8 DEMONSTRATION AND ORIENTATION DVD:

A. The Contractor must submit a final version of applicable demonstration and training electronic recordings in compliance with Section 01 79 00 DEMONSTRATION AND OWNER’S PRE-ACCEPTANCE ORIENTATION.

2.9 GUARANTEES AND WARRANTIES:

A. SCHEDULE B: Requirements for guarantees and warranties for the Project are set forth in Schedule B, which is included as part of the Addendum.

B. FORM: For all guaranty requirements set forth in Schedule B, the Contractor must provide a written guaranty, in the form set forth herein.

C. Submit fully executed and signed manufacturers’ warranties as listed in the Project Specifications and outlined in Schedule B of the Addendum. Refer to Section 01 77 00, CLOSEOUT PROCEDURES for submittal requirements.

GUARANTY

DDC PROJECT # _____

PROJECT DESCRIPTION _____

_____

CONTRACT # _____

SPECIFICATION SECTION # AND TITLE _____

_____

GUARANTY TO BE IN EFFECT FROM _____

TO _____

The Contractor hereby guarantees that the Work specified under the above section of the aforesaid Contract will be free from defects of material and/or workmanship, for the period indicated above.

The Contractor also guarantees that it will promptly repair, restore, rebuild or replace whichever may be deemed necessary by the City, any or all defective material or workmanship of the aforementioned section, that may appear within the guaranty period and any finished Work to which damage may occur because of such defects, to the satisfaction of the City and without any cost or expense to the City.

The Contractor hereby agrees to pay to the City the cost of the repairs or replacements should the City make the same because of the failure of the Contractor to do so.

Contractor: _____

By: _____
Signature of Partner or Corporate Officer

Print Name: _____

Subscribed and sworn to before me this
day of _____ , year _____

_____
Notary Public

2.10 WASTE DISPOSAL DOCUMENTATION:

A. Certify and deliver to the Commissioner all documentation including reports, receipts, certificates, records etc. for the collection, handling, storage, classification, testing, transportation, recycling and/or disposal of all Non-Hazardous Construction Waste as required by Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL, and Hazardous Waste as required by other Project Specification Sections. Certify compliance with all applicable governing laws, codes, rules and regulations.

2.11 MISCELLANEOUS RECORD DOCUMENTS:

A. Refer to other Project Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Prior to Final Acceptance, complete miscellaneous records and place in good order, properly identified and bound or otherwise organized to allow for use and reference.

B. Submit three (3) copies of each document to the Commissioner or as otherwise directed by the Commissioner.

PART III – EXECUTION

3.1 RECORDING AND MAINTENANCE:

A. Recording: Maintain one (1) copy of each submittal during the construction period for Contract Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of the Project.

B. Maintenance of Record Documents and Samples: Store Contract Record Documents and samples in the field office apart from the Contract Documents used for construction. Do not use Contract Record Documents for construction purposes. Maintain Contract Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to the Contract Record Documents for the Resident Engineer's reference during normal working hours.

END OF SECTION 01 78 39

SECTION 01 79 00
DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 79 00

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This section includes administrative and procedural requirements, when set forth in sections of the Project Specifications, for instructing the facility's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Owner's pre-acceptance orientation in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and orientation video recordings.

B. The Contractor must provide the services of orientation specialists from the Contractor's equipment manufacturers. The specialists must be experienced in the type of equipment to be demonstrated.

C. Separate orientation sessions must be conducted for mechanical operations and maintenance personnel and for electronic and electrical maintenance personnel.

D. Commissioning: Refer to the Addendum to identify whether this project is to be commissioned. For commissioned projects, the Contractor must provide demonstration and orientation as described in this section and cooperate with the Commissioning Authority/Agent (CxA) to implement commissioning requirements as described in Section 01 91 13, GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS, and/ or Section 01 91 15 BUILDING ENCLOSURE COMMISSIONNING REQUIREMENTS.

1.3 RELATED SECTIONS: include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 33 00 SUBMITTAL PROCEDURES
C. Section 01 77 00 CLOSEOUT PROCEDURES
D. Section 01 78 39 CONTRACT RECORD DOCUMENTS
E. Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS
F. Section 01 91 15 BUILDING ENCLOSURE COMMISSIONNING REQUIREMENTS
G. Specific requirements for demonstration and orientation indicated in other sections of the Project Specifications.

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	Definition
Commissioning Authority / Commissioning Agent (CxA)	The entity responsible for providing commissioning services for the Project. The entity serving as the CxA may be either an employee(s) of the City or an entity engaged by the City to provide such services.
Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the Design Consultant may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

1.5 SUBMITTALS:

A. Instruction Program: Submit three (3) copies of an outline of the instructional program for demonstration and orientation, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each orientation module to the Commissioner for approval no less than thirty (30) Days prior to the date the proposed orientation is to take place. Include learning objectives and outline for each orientation module.

1. At completion of orientation, submit three (3) complete training manual(s) and three (3) applicable video recording(s) to the Commissioner for the facility's and City's use.

B. Qualification Data: For facilitator, instructor and videographer.

C. Attendance Record: For each orientation module, submit a list of participants and length of instruction time.

D. Evaluations: For each participant and for each orientation module, submit results and documentation of performance-based test.

E. Submit all final orientation materials to the Resident Engineer a minimum of fourteen (14) Days prior to the scheduled orientation.

F. Demonstration and Orientation Recordings:

1. All Projects:

a. The Contractor must submit to the Commissioner three (3) copies of demonstration and orientation video recordings within seven (7) Days of end of each orientation module.

b. Identification: On each copy, provide an applied label with the following information:

1) Project Contract I.D. Number
2) Project Contract Name
3) Name of Contractor
4) Name of Subcontractor as applicable
5) Name of Design Consultant
6) Name of Construction Manager as applicable
7) Date recorded

8) Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
9) Table of Contents including list of systems covered.

c. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding DVD recording. Include name of Project and date of recording on each page.

d. Commissioned Projects: The Contractor must submit one (1) additional copy of the demonstration and orientation video recording to the CxA through the Resident Engineer who will include the approved recording in the commissioning report.

1.6 QUALITY ASSURANCE:

A. Facilitator Qualifications: A firm or individual experienced in orientation or educating maintenance personnel in an orientation program similar in content and extent to that indicated for this Project.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00 QUALITY REQUIREMENTS, experienced in operation and maintenance procedures and orientation.

C. Videographer Qualifications: A professional videographer who has experience with orientation and construction projects.

D. Pre-Instruction Conference: Schedule with the Resident Engineer a conference at Project Site in accordance with Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION. Review methods and procedures related to demonstration and orientation including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.7 COORDINATION:

A. Coordinate instruction schedule with the Resident Engineer and facility's operations. Adjust schedule as required to minimize disrupting facility's operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of orientation modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by the Commissioner.

PART II – PRODUCTS

2.1 INSTRUCTION PROGRAM:

A. Program Structure: Develop an instruction program that includes individual orientation modules for each system and equipment not part of a system, as specified and required by individual Specification Sections.

B. Orientation Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

1. For basis of system design, operational requirements, and criteria, include the following:
   a. System, subsystem, and equipment descriptions;
   b. Performance and design criteria if Contractor is delegated design responsibility;
   c. Operating standards;
   d. Regulatory requirements;
   e. Equipment function including auxiliary equipment and systems;
   f. Operating characteristics;
   g. Limiting conditions; and
   h. Performance curves.

2. For documentation, review the following items in detail:
   a. Emergency manuals;
   b. Operations manuals;
   c. Maintenance manuals;
   d. Project Record Documents;
   e. Identification systems; and
   f. Warranties.

3. For emergencies, include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages;
   b. Instructions on stopping;
   c. Shutdown instructions for each type of emergency;
   d. Operating instructions for conditions outside of normal operating limits;
   e. Sequences for electric or electronic systems; and
   f. Special operating instructions and procedures.

4. For operations, include the following, as applicable:
   a. Startup procedures;
   b. Equipment or system break-in procedures;
   c. Routine and normal operating instructions;
   d. Regulation and control procedures;
   e. Control sequences;
   f. Safety procedures;
   g. Instructions on stopping;
   h. Normal shutdown instructions;
   i. Operating procedures for emergencies;
   j. Operating procedures for system, subsystem, or equipment failure;
   k. Seasonal and weekend operating instructions;
   l. Required sequences for electric or electronic systems; and
   m. Special operating instructions and procedures.

5. For adjustments, include the following:
   a. Alignments;
   b. Checking adjustments;
   c. Noise and vibration adjustments; and
   d. Economy and efficiency adjustments.

6. For troubleshooting, include the following:
   a. Diagnostic instructions; and
   b. Test and inspection procedures.

7. For maintenance, include the following:
   a. Inspection procedures;
   b. Types of cleaning agents to be used and methods of cleaning;
   c. List of cleaning agents and methods of cleaning detrimental to product;
   d. Procedures for routine cleaning;
   e. Procedures for preventive maintenance;
   f. Procedures for routine maintenance;
   g. Instruction on use of special tools; and
   h. Housekeeping practices.

8. For repairs, include the following:
   a. Diagnosis instructions;
   b. Repair instructions;
   c. Disassembly, component removal, repair, and replacement; and reassembly instructions;
   d. Instructions for identifying parts and components; and
   e. Review of spare parts needed for operation and maintenance.

PART III – EXECUTION

3.1 INSTRUCTION:

A. Facilitator: Engage a qualified facilitator to prepare the instruction program and orientation modules, to coordinate instructors, and to coordinate between Contractor and the Resident Engineer for the number of participants, instruction times, and location.

B. The Contractor must engage qualified instructors to instruct the facility's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

C. Scheduling: Schedule instruction with the Resident Engineer at mutually agreed upon times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.

   1. Schedule orientation with the Resident Engineer with at least fourteen (14) Days advance notice.

D. Evaluation: At the conclusion of each orientation module, assess and document each participant's mastery of module(s) by use of an oral or written demonstration performance-based test.

E. Cleanup: Collect and remove used and leftover educational materials from Project Site. Remove instructional equipment. Restore systems and equipment to condition existing before initial orientation use.

3.2 DEMONSTRATION AND ORIENTATION VIDEO RECORDINGS:

A. All projects:

   1. The Contractor must engage a qualified commercial videographer to video record demonstration and orientation sessions. Record each orientation module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

   2. At the beginning of each orientation module, record each chart containing learning objective and lesson outline.

   3. All recordings must be close-captioned.

4. Recording Format: Provide high-quality video recording on USB drive or other electronic media as requested by the Commissioner.

5. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and orientation. Display continuous running time.

6. Narration: Describe scenes on the recording by audio narration by microphone while recording or by dubbing audio narration off-site after. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

7. Transcript: Provide a typewritten transcript of the narration. Display images and running time captured from opposite the corresponding narration segment.

B. Commissioned Projects: Refer to the Addendum to determine if the project is to be commissioned.

1. The Commissioning Authority/Agent (CxA) under separate contract with the City of New York will assess and comment on the adequacy of the orientation instruction sessions by reviewing the orientation and instruction program and agenda provided by the Contractor. The provider of the orientation program will video record the sessions and provide a copy to the CxA for final review and comments. If necessary, Contractor must edit the recording per CxA comments.

END OF SECTION 01 79 00

SECTION 01 81 13.04
SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 81 13.04

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. LEED BUILDING - GENERAL REQUIREMENTS**:**

The City of New York is committed to implementing good environmental practices and procedures which include achieving a LEED™ Green Building rating. Specific Project requirements related to this goal are listed in the applicable paragraphs of this section of the General Conditions. The Contractor must ensure that these requirements as defined in the sections below and in related sections of the Contract Documents, are implemented to the fullest extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, will not be allowed if such changes compromise the stated LEED BUILDING criteria.

B. This Section includes:

1. Definitions
2. LEED Provisions
3. LEED Building Submittals
4. LEED Building Submittal Requirements
5. LEED Action Plan
6. VOC Requirements for Interior Adhesives and Sealants
7. VOC Requirements for Interior Paints and Coatings
8. Low-Emitting Materials, Flooring
9. Low-Emitting Materials, Composite Wood
10. Low-Emitting Materials, Ceilings, Walls, Thermals and Acoustic Insulation
11. Low-Emitting Materials, Furniture
12. Low-Emitting Materials, Exterior Applied Products
13. Low-Emitting Materials, Additional Low-Emitting Requirements

C. This Section includes requirements for Volatile Organic Compound (VOC) emissions and content in specific materials used within the Project.

D. All sections in the Project Specifications with adhesives, sealant or sealant primer applications, paints, coatings, flooring, composite wood, ceilings, walls, thermal and acoustic insulation, furniture, and for healthcare and schools, exterior applied products, must follow all requirements of this section. In the event of any conflict or inconsistency between this section and the Specifications regarding adhesives, sealant or sealant applications, paints, coatings, flooring, composite wood, ceilings, walls, thermal and acoustic insulation, furniture, and for healthcare and schools, exterior applied products, the requirements set forth in this Section will prevail.

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
B. Section 01 81 19 INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS
C. Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS
D. Section 01 91 15 GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Adhesive	Any substance used to bond one surface to another by attachment. Includes adhesive primers and adhesive bonding primers.
Aerosol Adhesive	Any adhesive packaged as an aerosol with a spray mechanism permanently housed in a non-refillable can designed for hand-held application without the need for ancillary equipment
Agrifiber Products	Products derived from recovered agricultural waste fiber from sources such as cereal straw, sugarcane bagasse, sunflower husk, walnut shells, coconut husks and agricultural prunings, processed and mixed with resins to produce panels with characteristics similar to composite wood.
Bio-based materials	Composed in whole or in significant part of biological products, renewable agricultural materials or forestry materials, and must meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials must be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country. Exclude hide products, such as leather and other animal skin material.
Building Exterior	A structure's primary and secondary weatherproofing system, including waterproofing membranes and air- and water-resistant barrier materials, and all building elements outside that system.
Building Interior	Everything inside a structure's weatherproofing membrane.
Carcinogen	A chemical listed as a known, probable, reasonably anticipated, or possible human carcinogen by the International Agency for Research on Cancer

	(IARC) (Groups 1, 2A, and 2B), the National Toxicology Program (NTP) (Groups 1 and 2), the U.S. Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS) (weight-of-evidence classifications A, B1, B2, and C, carcinogenic, likely to be carcinogenic, and suggestive evidence of carcinogenicity or carcinogen potential), or the Occupational Safety and Health Administration (OSHA).
Certified Wood	See Forest Stewardship Council (FSC) Certified Wood.
Clear Wood Finish	Clear/semi-transparent coating applied to wood substrates to provide a transparent or translucent solid film.
Coating	Liquid, liquefiable or mastic composition that is converted to a solid adherent film after application to a substrate as a thin layer; and is used for decorating, protecting, identifying or to serve some functional purpose such as the filling or concealing of surface irregularities or the modification of light and heat radiation characteristics; and is intended for on-site application to interior or exterior surfaces of buildings. Does not include stains, clear finishes, recycled latex paint, specialty (industrial, marine or automotive) coatings or paint sold in aerosol cans.
Composite Wood	Products composed of wood or plant particles or fibers bonded by a synthetic resin or binder to produce panels such as plywood, particleboard, and medium density fiberboard (MDF). Does not include hardboard, structural panels, glued laminated timber, prefabricated wood I-joists or finger-jointed lumber.
Cradle-to-Gate Assessment	Analysis of a product's partial life cycle, from resource extraction to the factory gate, before it is transported for distribution and sale.
Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.

Enclosure	The exterior plus semi-exterior portions of the building. Exterior consists of the elements of a building that separate conditioned spaces from the outside (i.e., the wall assembly). Semi-exterior consists of the elements of a building that separate conditioned space from unconditioned space or that encloses semi-heated space through which thermal energy may be transferred to or from the exterior or conditioned or unconditioned spaces (e.g., attic, crawl space, basement).
Environmental Product Declaration (EPD)	A statement that the item meets the environmental requirements of, ISO 14025, 14040 and EN 15804, or ISO 21930 and have at least a cradle-to-gate scope.
Extended Producer Responsibility	A waste management strategy, also known as closed-loop program or product take-back, where the manufacturer's responsibility for a product is extended to the post-consumer stage of the product's life-cycle.
Floor Coating	Opaque coating applied to flooring. Excludes industrial maintenance coatings.
Forest Stewardship Council (FSC) Certified Wood	Wood-based materials and products certified in accordance with the Forest Stewardship Council's principles and criteria.
Hazardous Air Pollutant	Any compound listed by the U.S. EPA in the Clean Air Act Section 112(b)(1) as a hazardous air pollutant.
Inherently Non-Emitting Materials	Products that are inherently non-emitting sources of VOCs, including stone, ceramic, powder-coated metals, plated or anodized metals, lass, concrete, clay brick, unfinished solid wood, untreated solid wood. These materials are considered compliant without VOC testing if they do not include integral organic-based surface coatings, binders or sealants.
Lacquer	Clear/semi-transparent coating formulated with cellulosic or synthetic resins to dry by evaporation without chemical reaction and provide a solid, protective film.

LEED	The Leadership in Energy & Environmental Design rating system developed by the United States Green Building Council (USGBC).
Life-Cycle Assessment	An evaluation of the environmental effects of a product from cradle to grave, as defined by ISO 14040-2006 and ISO 14044-2006.
Mutagen	A chemical that meets the criteria for category 1, chemicals known to induce heritable mutations or to be regarding as if they induce heritable mutations in the germ cells of humans, under the Harmonized System for the Classification of Chemicals Which Cause Mutations in Germ Cells (United Nations Economic Commission for Europe, Globally Harmonized System of Classification and Labeling of Chemicals).
Ozone-Depleting Compounds	A compound with an ozone-depletion potential greater than 0.1 (CFC 11=1) according to the U.S. EPA list of Class I and Class II Ozone-Depleting Substances.
Paint	A pigmented coating. For the purposes of this specification, paint primers are considered to be paints. A. Flat Coating or Paint: Has a gloss of less than 15 (using an 85-degree meter) or less than 5 (using a 60-degree meter). B. Non-Flat Coating or Paint: Has a gloss of greater than or equal to 15 (using an 85-degree meter) or greater than or equal to 5 (using a 60-degree meter). C. Non-Flat High-Gloss Coating or Paint: Has a gloss of greater than or equal to 70 (using a 60-degree meter). Anti-Corrosive / Rust Preventative Paint: Coating formulated and recommended for use in preventing the corrosion of ferrous metal substrates.
Permanently Installed Building Product	See Product.
Primer	Coating that is formulated and recommended for one or more of the following purposes: to provide a firm bond between the substrate and a subsequent coating; to prevent a subsequent coating from being absorbed into the substrate; to prevent harm to a subsequent coating from materials in the

	substrate; or to provide a smooth surface for application of a subsequent coating.
Product	An item that arrives on the Project site either as a finished element ready for installation or as a component to another item assembled on-site. The product unit is defined by the functional requirement for use in the Project; this includes the physical components and services needed to serve the intended function of the permanently installed building product. Similar products within a specification will each contribute as a separate product.
Product-Specific Declaration	Products with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that have at least a cradle-to-gate scope.
Recycled Content	The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer) or after consumer use (post-consumer). Recycled content claims for products must conform to the definition in ISO 14021-1999, Environmental Labels and Declarations, Self-Declared Environmental Claims (Type II Environmental Labeling). Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials. “Pre-consumer” may also be referred to as “post-industrial”.

Regionally Manufactured Materials	Materials that are manufactured, distributed and purchased within a radius of 100 miles from the Project location. Manufacturing refers to all points of manufacture for an assembly of components.
Regionally Extracted, Harvested, or Recovered Materials	Materials which are extracted, harvested or recovered, manufactured, distributed and purchased within a radius of 100 miles from the Project site.
Reproductive Toxin	A chemical listed as a reproductive toxin (including developmental, female, and male toxins) by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Code of Regulations, Title 22, Division 2, Subdivision 1, Chapter 3, Sections 1200, et. Seq.).
Sanding Sealer	Clear/semi-transparent coating formulated to seal bare wood. Can be abraded to create a smooth surface for subsequent coatings. Does not include sanding sealers that are lacquers (see Clear Wood Finish above).
Sealant	Any material with adhesive properties, formulated primarily to fill, seal, or waterproof gaps or joints between surfaces. Includes sealant primers and caulks.
Shellac	Clear or pigmented coating formulated solely with the resinous secretions of the lac beetle, thinned with alcohol and formulated to dry by evaporation without chemical reaction. Excludes floor applications.
Solar Reflectance Index (SRI)	A measure of a material's ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is equal to 0, and a standard white (reflectance 0.80, emittance of 0.90) is equal to 100.
Stain	Clear semi-transparent/opaque coating formulated to change the color but not conceal the grain pattern or texture of the substrate.
Varnish	Clear/semi-transparent coating, excluding lacquers and shellacs, formulated to dry by chemical reaction on exposure to air. May contain small amounts of pigment.

Volatile Aromatic Compound	Any hydrocarbon compound containing one or more 6-carbone benzene rings, and having an initial boiling point less than or equal to 280 degrees Celsius measured at standard conditions of temperature and pressure.
Volatile Organic Compound (VOC)	Any compound of carbon (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate) which vaporizes (becomes a gas) and participates in atmospheric photochemical reactions, as specified in Part 51.00 of Chapter 40 of the U.S. Code of Federal Regulations, at normal room temperatures. For the purposes of this specification, formaldehyde and acetaldehyde are considered to be VOCs.Waterproofing Sealer: A coating that prevents the penetration of water into porous substrates.

1.5 LEED PROVISIONS:

A. Refer to the Addendum for the LEED rating to be achieved for this Project. The provisions to achieve this LEED rating are integrated within the Project construction documents and specifications. Additional LEED requirements are met through aspects of the Project design, including material and equipment selections, which may not be specifically identified as LEED Building requirements. Compliance with the requirements needed to obtain LEED prerequisites and credits will be used as one criterion to evaluate substitution requests.

1.**6 LEED BUILDING SUBMITTALS:**

A. Scope: LEED Building Submittals are required for all permanently installed materials included in General Construction work. For Plumbing, Mechanical and Electrical work, LEED Building Submittals are only required for field-applied adhesives, sealants, paints and coatings. Voluntary inclusion of system components such as piping, pipe insulation, ducts, conduits, plumbing fixtures, faucets and lamp housings must be consistently applied to the Project's LEED credits. Submit all required LEED Building Submittals in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

B. Applicability: The extent of the LEED Building Submittals varies depending on the specification section. Applicable LEED Building Submittals are listed under the "LEED Building Submittals" heading in each specification section. The detailed requirements for the LEED Building Submittals are defined in Sub-Section 1.6 C below.

C. Detailed Requirements: Sub-Sections 1.6 C.1 through 1.6 C.18 below define the information and documents to be submitted for each type of LEED Building Submittal as identified in the LEED Building Submittals heading in each specification section:

1. LEED v4 Material and Resources (MR) Credits Calculator for Building Product Disclosure and Optimization (Disclosure and Optimization Calculator): With each submittal of a product permanently installed in the Project, the Contractor is responsible for the completion of the

Disclosure and Optimization Calculator, which can be found on USGBC's website. The Contractor must maintain an updated Disclosure and Optimization Calculator for all applicable products throughout the Project duration and submit the updated calculator on a monthly basis.

a. The Disclosure and Optimization Calculator will record the information outlined in Items b.-c. below for all permanently installed products, the information outlined in Item d. below for all permanently installed concrete mixes, and the information outlined in Items e.-i. below for all permanently installed products that have the content, disclosure or optimization characteristics described herein:

b. Cost breakdowns for the materials included in the Contractor or Subcontractor's scope of work. Cost reporting must include itemized material costs (excluding the Contractor's labor, equipment, overhead and profit).

c. The percentages (by weight) of post-consumer and/or post-industrial recycled content in the supplied product(s).
   1) For each product with recycled content, also indicate the total recycled content value (1/2 x pre-consumer percentage x product value + 1 x post-consumer percentage x product value = total recycled content value).
   2) See additional requirements for concrete in section 1.6.C.1.d below.

d. The percentage (by weight), relative to the total weight of cementitious materials, of supplementary cementitious materials or pozzolans such as fly ash used in each concrete mix used in the Project.
   1) For each concrete mix, submit a complete breakdown of all components, by weight and by cost.

e. Identification (Yes/No) of materials manufactured, distributed and purchased within 100 miles of the Project site AND containing raw materials harvested or extracted within 100 miles of the Project site, if used in the Project, as well as the following information:
   1) Indicate the percentage by weight, relative to the total weight of the product that meets these criteria.
   2) Indicate the point of harvest/extraction/recovery of regional raw materials, the point of final assembly of regional manufactured products, and the distance from each point to the Project site.

f. The percentage (by cost) of "Forest Stewardship Council (FSC) Certified" wood products, if used in the Project.
   1) Record all new wood products, indicating which are FSC-certified. Do not record reclaimed, salvaged, or recycled FSC-certified wood products.
   2) Reclaimed, salvaged, or recycled FSC-certified wood may be recorded as post-consumer recycled content.

g. The number or percentage of products with Environmental Product Declarations (EPD), with fractional or multiplied values as indicated below. If a product used in the Project has an EPD Declaration, submit one of the following:
   1) EPD:
      i. Product-Specific Declaration: Valued as one quarter (1/4) of a product
      ii. Industry-Wide (Generic) EPD: Valued as one half (1/2) of a product
      iii. Product-Specific Type III EPD: Valued as one whole product
   2) Documentation of third-party certification of impact reduction below industry average for at least three of the following categories, valued at 100%:
      i. Global warming potential (greenhouse gases), in CO_2e;
      ii. Depletion of the stratospheric ozone layer, in kg CFC-11;
      iii. Acidification of land and water sources, in moles H+ or kg SO_2;
      iv. Eutrophication, in kg nitrogen or kg phosphate;
      v. Formation of tropospheric ozone, in kg NOx or kg ethene; and depletion of nonrenewable energy resources, in MJ.

3) For 1) and 2) above, if a product is also sourced (extracted, manufactured, purchased) within 100 miles of the site, it is valued as two times the whole product.

4) For 1) and 2) above, structure and enclosure materials may not constitute more than 30% of the value of compliant building products.

h. The number or percentage of products for which Sourcing of Raw Materials has been documented, with fractional or multiplied values as indicated below. If a product used in the Project has documented Sourcing of Raw Materials, submit one of the following:

1) Corporate sustainability report (CSR). Submit one of the following:
   i. Manufacturer's self-declared report: valued as half of a product
   ii. Third-party verified CSR which include environmental impacts of extraction operations and activities associated with the manufacturer's product and the product's supply chain: valued as one whole product:
      1. Global Reporting Initiative (GRI) Sustainability Report
      2. Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises
      3. U.N. Global Compact: Communication of Progress
      4. ISO 26000: 2010 Guidance on Social Responsibility
      5. Other USGBC approved programs meeting the CSR criteria

2) Documentation of at least one of the responsible extraction criteria below:
   i. Extended producer responsibility program, valued as half of a product
   ii. Bio-based materials, valued as one whole product
   iii. Certified Wood: Wood-based materials include all materials made from wood, including engineered wood products and wood-based panel products, valued as one whole product
   iv. Material Reuse: Materials may be salvaged, refurbished, or reused, valued as one whole product.
   v. Recycled content. The sum of post-consumer recycled content plus one-half the pre-consumer recycled content, based on cost, valued as one whole product.
   vi. Other USGBC approved programs meeting leadership extraction criteria

3) For 1) and 2) above, if a product is also sourced (extracted, manufactured, purchased) within 100 miles of the site: valued as two times the whole product.

4) For 1) and 2) above, structure and enclosure materials may not constitute more than 30% of the value of compliant building products. Products meeting multiple criteria may only be counted once.

i. The number or percentage of products for which Material Ingredients have been disclosed, with fractional or multiplied values as indicated below. If a product used in the Project discloses its Material Ingredients, submit one of the following:

1) Chemical inventory of the product to at least 0.1% (1000 ppm), documented by one of the following:
   i. Manufacturer Inventory
   ii. Health Product Declarations (HPDs)
   iii. Cradle to Cradle (C2C) certifications
   iv. Declare product labels
   v. ANSI/BIFMA e3 Furniture Sustainability Standard (Furniture may be included, providing it is included consistently in all MR Credits.)

2) Documentation of compliance with one of the following material ingredient optimization criteria programs:
   i. GreenScreen benchmarks
   ii. Cradle to Cradle certifications
   iii. REACH optimizations
   iv. Other USGBC approved programs meeting building product optimization criteria

3) Documentation that the product is sourced from a manufacturer that meets all of the below supply chain optimization criteria:
   i. Manufacturer engages in validated and robust safety, health, hazard and risk programs which at a minimum document at least 99% (by weight) of the ingredients used to make the building product or building material
   ii. Manufacturer provides independent third party verification of the following conditions for their supply chain, at a minimum:
      1. Processes are in place to communicate and transparently prioritize chemical ingredients along the supply chain according to available hazard, exposure and use information to identify those that require more detailed evaluation
      2. Processes are in place to identify, document, and communicate information on health, safety and environmental characteristics of chemical ingredients
      3. Processes are in place to implement measures to manage the health, safety and environmental hazard and risk of chemical ingredients
      4. Processes are in place to optimize health, safety and environmental impacts when designing and improving chemical ingredients
      5. Processes are in place to communicate, receive and evaluate chemical ingredient safety and stewardship information along the supply chain
      6. Safety and stewardship information about the chemical ingredients is publicly available from all points along the supply chain

4) For 2) and 3) above, if a product is also sourced (extracted, manufactured, purchased) within 100 miles of the site: valued as two times the whole product. Products compliant with both 2) and 3) may only be counted once.

5) For 1), 2), and 3) above, structure and enclosure materials may not constitute more than 30% of the value of compliant building products.

2. LEED v4 Indoor Environmental Quality Credit Low-Emitting Materials Calculator (EQ Calculator). With each relevant product submittal, the Contractor is responsible for the completion of the EQ Calculator, which can be found on USGBC's website. The Contractor must maintain an updated EQ Calculator throughout the Project duration for all applicable products and submit the updated calculator on a monthly basis.

   a. The EQ Calculator must record information for all relevant products as outlined below. Include the following documentation. Detailed requirements are listed in b. – j. below.
      1) Volume used of all field applied interior adhesives, sealants, paints & coatings.
      2) VOC content of all field-applied interior adhesives, sealants, paints, and coatings, listed in grams/liter or lbs./gallon, less water.
      3) General Emissions Evaluation for more than 90 percent of all field-applied interior paints, coatings, adhesives, and sealants, by volume, and for 100 percent of all flooring, ceilings, walls, and thermal and acoustic insulation.
      4) Composite Wood Evaluation for all composite wood not covered by other categories.
      5) Furniture Evaluation for 90% of all furniture, by cost.

6) For schools/healthcare only: Exterior-Applied Products Evaluation for 90% of all exterior applied materials, measured by volume. All batt insulation products must contain no added formaldehyde.

b. VOC REQUIREMENTS, GENERAL: The following materials must meet the listed compliance requirements for emissions and content standards, for all applicable categories. All products must comply with each applicable threshold requirement. Refer to LEED BD+C Reference Guide, EQ Credit Low-Emitting Materials for additional guidance.

1) General Emissions Requirements: Products must demonstrate they have been tested and determined compliant in accordance with California Department of Public Health (CDPH), Standard Method v1.1-2010 or v1.2-2017, using the applicable exposure scenario, and stating the range of total VOCs (TVOC) after 14 days measured as specified in the CDPH Standard Method v1.1 as follows:
   i. 0.5mg/m3 or less;
   ii. between 0.5 and 5.0 mg/m3; or,
   iii. 0.50 mg/m3 or more
2) No product may contain any ingredients that are carcinogens, mutagens, reproductive toxins, persistent bioacculmulative compounds, hazardous air pollutants, or ozone-depleting compounds. An exception will be made for titanium dioxide and, for products that are pre-tinted by the manufacturer, carbon black, which must be less than or equal to 1% by weight of the product.
3) No product may contain the following:
   i. methylene chloride
   ii. 1,1,1-trichloroethane
   iii. benzene
   iv. toluene
   v. ethylbenzene
   vi. vinyl chloride
   vii. naphthalene
   viii. 1,2-dichlorobenzene
   ix. di (2-ethylhexyl) phthalate
   x. butyl benzyl phthalate
   xi. di-n-butyl phthalate
   xii. di-n-octyl phthalate
   xiii. diethyl phthalate
   xiv. dimethyl phthalate
   xv. isophorone
   xvi. antimony
   xvii. cadmium
   xviii. hexavalent chromium
   xix. lead
   xx. mercury
   xxi. formaldehyde
   xxii. methyl ethyl ketone
   xxiii. methyl isobutyl ketone
   xxiv. acrolein
   xxv. acrylonitrile
4) No product may contain more than 1.0% by weight of sum total of volatile aromatic compounds.

c. VOC REQUIREMENTS FOR INTERIOR ADHESIVES AND SEALANTS:

1) For field applications that are inside the weatherproofing system, use adhesives and sealants that comply with the following limits for VOC content when calculated

according to South Coast Air Quality Management District (SCAQMD) Rule #1168 requirements in effect on July 1, 2005, and rule amendment date January 7, 2005:

	Allowable VOC Content (g/L):
Architectural Applications:	
Indoor carpet adhesives	50
Carpet pad adhesives	50
Outdoor carpet adhesives	150
Wood flooring adhesives	100
Rubber floor adhesives	60
Subfloor adhesives	50
Ceramic tile adhesives	65
VCT and asphalt tile adhesives	50
Dry wall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single ply roof membrane adhesives	250
Specialty Applications:	
PVC welding	510
CPVC welding	490
ABS welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Computer diskette manufacturing	350
Contact adhesive	80
Special purpose contact adhesive	250
Tire retread	100
Adhesive primer for traffic marking tape	150
Structural wood member adhesive	140
Sheet applied rubber lining operations specialty	850
Top and Trim adhesive	250
Substrate Specific Applications:	
Metal to metal substrate specific adhesives	30
Plastic foam substrate specific adhesives	50
Porous material (except wood) substrate specific adhesives	50
Wood substrate specific adhesives	30
Fiberglass substrate specific adhesives	80
Sealants:	
Architectural sealant	250
Marine deck sealant	760
Nonmember roof sealant	300
Roadway sealant	250
Single-ply roof membrane sealant	450
Other sealant	420
Sealant Primers:	
Architectural non-porous sealant primer	250
Architectural porous sealant primer	775

Modified bituminous sealant primer	500
Marine deck sealant primer	760
Other sealant primer	750
Other	
Other adhesives, adhesive bonding primers, adhesive primers or any other primers	250

2) For field applications that are inside the weatherproofing system, a minimum of 90 percent of adhesives and sealants, by volume, must comply with the requirements of the CDPH "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

d. VOC REQUIREMENTS FOR INTERIOR PAINTS AND COATINGS:

1) For field applications that are inside the weatherproofing system, use paints and coatings that comply with the following limits for VOC content when calculated according to the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the SCAQMD Rule #1113, effective June 3, 2011.

Product Type:	Allowable VOC Content (g/L):
Bond Breaker	350
Clear wood finishes - Varnish	275
Clear wood finishes – Sanding Sealer	275
Clear wood finishes - Lacquer	275
Colorant – Architectural Coatings, excluding IM coatings	50
Colorant – Solvent Based IM	600
Colorant - Waterborne IM	50
Concrete – Curing compounds	100
Concrete – Curing compounds for roadways & bridges	350
Concrete surface retarder	50
Driveway Sealer	50
Dry-fog coatings	50
Faux finishing coatings - Clear topcoat	100
Faux finishing coatings – Decorative Coatings	350
Faux finishing coatings - Glazes	350
Faux finishing coatings - Japan	350
Faux finishing coatings – Trowel applied coatings	50
Fire-proof coatings	150
Flats	50
Floor coatings	50
Form release compounds	100
Graphic arts (sign) coatings	150
Industrial maintenance coatings	100
Industrial maintenance coatings – High temperature IM coatings	420
Industrial maintenance coatings – Non-sacrificial anti-graffiti coatings	100
Industrial maintenance coatings – Zinc rich IM primers	100

Magnesite cement coatings	450
Mastic coatings	100
Metallic pigmented coatings	150
Multi-color coatings	250
Non-flat coatings	50
Pre-treatment wash primers	420
Primers, sealers and undercoaters	100
Reactive penetrating sealers	350
Recycled coatings	250
Roof coatings	50
Roof coatings, aluminum	100
Roof primers, bituminous	350
Rust preventative coatings	100
Stone consolidant	450
Sacrificial anti-graffiti coatings	50
Shellac- Clear	730
Shellac – Pigmented	550
Specialty primers	100
Stains	100
Stains, interior	250
Swimming pool coatings – repair	340
Swimming pool coatings – other	340
Traffic Coatings	100
Waterproofing sealers	100
Waterproofing concrete/masonry sealers	100
Wood preservatives	350
Low solids coatings	120

2) For field applications that are inside the weatherproofing system, 90 percent of paints and coatings must comply with the requirements of the CDPH's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

e. LOW-EMITTING MATERIALS, FLOORING: Flooring must comply with the requirements of the CDPH's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
f. LOW-EMITTING MATERIALS, COMPOSITE WOOD: Composite wood, agrifiber products, and adhesives must be made using ultra-low-emitting formaldehyde (ULEF) resins as defined in the CARB's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or must be made with no added formaldehyde.
g. LOW-EMITTING MATERIALS, CEILINGS, WALLS, THERMAL, AND ACOUSTIC INSULATION: Ceilings, walls, and thermal and acoustic insulation must comply with the requirements of the CDPH's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
h. LOW-EMITTING MATERIALS, FURNITURE: At least 90 percent of furniture, measured by cost, will be tested in accordance with ANSI/BIFMA Standard Method M7.1-2011; comply with ANSI/BIFMA e3-2011 Furniture Sustainability Standard, Sections 7.6.1 and 7.6.2, using either the concentration modeling approach or the emissions factor approach; and model the test results using the open plan, private office, or seating scenario in ANSI/BIFMA M7.1, as appropriate.
i. LOW-EMITTING MATERIALS, EXTERIOR APPLIED MATERIALS (HEALTHCARE/ SCHOOLS ONLY): At least 90 percent of exterior applied materials, measured by volume,

must comply with the requirements of the CDPH's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

1) The following materials are prohibited and do not count toward total percentage compliance:
   a) Hot-mopped asphalt for roofing.
   b) Coal tar sealants for parking lots and other paved surfaces.

j. LOW-EMITTING MATERIALS, ADDITIONAL LOW-EMITTING REQUIREMENTS: If the applicable regulation requires subtraction of exempt compounds, any content of intentionally added exempt compounds larger than 1% weight by mass (total exempt compounds) must be disclosed.

1) If a product cannot reasonably be tested as specified above, testing of VOC content must comply with ASTM D2369-10; ISO 11890, part 1; ASTM D6886-03; or ISO 11890-2.

2) Methylene chloride and perchloroethylene may not be intentionally added in adhesives, sealants, paints or coatings.

3. BACK-UP DOCUMENTATION: For each material listed in the Disclosure and Optimization Calculator or the EQ Calculator, provide and submit in accordance with Section 01 33 00 SUBMITTAL PROCEDURES, including but not limited to the documentation to certify the material's LEED Building attributes, as applicable:

a. INSTALLATION ON LOCATION: Submit indication of the installation location of products other than adhesives, sealants, paints and coatings. Installation locations should be categorized as one of the following:
   1) Ceiling
   2) Wall
   3) Floor
   4) Subfloor
   5) Built-In Cabinetry
   6) Free-Standing Cabinetry
   7) Vertical Structural Elements
   8) Overhead Structural Elements

b. RECYCLED CONTENT: Submit published product literature or letter of certification on the manufacturer's letterhead certifying the amounts of post-consumer and/or post-industrial content.

c. REGIONAL SOURCING (WITHIN 100 MILES): Submit published product literature or letter of certification on the manufacturer's letterhead indicating the city/state where the manufacturing plant is located, where each of the raw materials in the product were extracted, harvested or recovered, manufactured, distributed and the distance in miles from the Project site.
   1) If only some of the raw materials for a particular product or assembly originate within 100 miles of the Project site, provide the percentage (by weight) that these materials comprise in the complete product.

d. BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION: Submit published third-party or manufacturer's product literature or letter of certification, on the third-party or manufacturer's letterhead, certifying the documented disclosure and optimization information.

e. VOC EMISSIONS AND CONTENT: Submit Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings, flooring, composite wood, ceilings, walls, thermal and acoustic insulation, furniture, and for healthcare and schools, exterior applied products. MSDS must

indicate the VOC emissions and content of products submitted. (If an MSDS does not include a product's VOC emissions and content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer must be submitted in addition to the MSDS to indicate the VOC emissions and content). Submit product third-party certificates and test reports, stating the testing methodology and the model, to include units that are consistent with those required. For wet-applied products, the manufacturer's documentation must state each product's classification and application according to the referenced standard's definition.

4. PRODUCT CUT SHEETS: Submit product cut sheets with the Contractor's or sub-contractor's stamp, confirming that the submitted products are the products installed in the Project.

5. FSC-CERTIFIED WOOD: If FSC-Certified Wood is used in the Project, submit:
   a. Copies of vendor's invoices itemizing all new wood purchases, showing the cost for each line item.
   b. For FSC-certified products, the vendor invoice must list product's FSC content percent and its Chain-of-Custody (CoC) certification number.
   c. For FSC-certified products, submit the product and producer's CoC certificates.
   d. For FSC-certified products modified on-site, submit on-site installer's CoC certification.
   e. For assemblies, submit the percentage (by cost and by weight) of the assembly that is FSC-certified wood and published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying the percentage that is FSC-certified wood.

6. HIGH ALBEDO PAVING AND WALKWAY MATERIALS: For paving and walkway materials made from concrete or brick, submit published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying a minimum 3-year aged Solar Reflectance (SR) value of 0.28. If 3-year aged value information is not available, submit published product literature or letter verifying an initial SR value of at least 0.33 at installation.

7. HIGH ALBEDO ROOFING MATERIALS: For exposed roofing membranes, pavers, and ballast products, submit published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying the following minimum Solar Reflectance Index (SRI) values, calculated according to ASTM E 1980. Reflectance will be measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance will be measured according to ASTM E 408 or ASTM C 1371. Vegetated roof surfaces are exempt from the SRI criteria.

   a. 82 for initial SRI, or 64 for 3-year aged SRI for low-sloped roofing applications (slope ≤ 2:12)
   b. 39 for initial SRI or 32 for 3-year aged SRI for steep-sloped roofing applications (slope > 2:12)

8. LOW MERCURY LAMPS: For all fluorescent, compact fluorescent and HID lamps installed in the Project, submit the total number of each lamp type and submit published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying the following information. Preheat, T-9, T-10 and T-12 fluorescents or mercury vapor high-intensity discharge (HID) lamps must not be installed in the Project. For healthcare projects only, probe-start metal halide HID lamps must not be installed in any interior spaces.

   a. The mercury content or content range per lamp in milligrams or picograms, meeting the following criteria;

Lamp	Maximum Mercury Content (milligram)
T-8 fluorescent, eight-foot	10 mg
T-8 fluorescent, four-foot	3.5 mg
T-8 fluorescent, U-bent	6 mg
T-5 fluorescent, linear	2.5 mg
T-5 fluorescent, circular	9 mg
Compact fluorescent, nonintegral ballast	3.5 mg
Compact fluorescent, integral ballast	3.5 mg, ENERGY STAR qualified

High-pressure sodium, up to 400 watts	10 mg
High-pressure sodium, above 400 watts	32 mg

b. The design light output per lamp (light at 40% of a lamp's useful life) in lumens; and
c. The rated average life of the lamp in hours.

9. EXIT SIGNS: Illuminated exit signs must not contain mercury, and must use less than 5 watts of electricity.

10. CONCRETE: Submit concrete mix design for each mix, designated by a distinct identifying code or number and signed by a Professional Engineer licensed in the state of New York.

11. INTERIOR LIGHTING FIXTURES: For each lighting fixture type installed within the building's weather barrier, submit manufacturer's cut sheets indicating the following:

    a. Fixture power in watts.
    b. Initial lamp lumens.
    c. Photometric distribution data.
    d. Dimming capability, in range of percentages.

12. EXTERIOR LIGHTING FIXTURES: For each lighting fixture type installed on site, submit manufacturer's cut sheets indicating the following:

    a. Fixture power in watts.
    b. Initial lamp lumens.
    c. Photometric distribution data.
    d. Range of field adjustability, if any.
    e. Warranty of suitability for exterior use.

13. ALTERNATIVE TRANSPORTATION: Submit manufacturer's cut sheets and/or shop drawings for the following items installed on site:

    a. Bike racks, including total number of bicycle slots provided.
    b. Signage indicating parking spaces reserved for electric or low-emitting vehicles and for carpools/vanpools, including total number of signs.

14. WATER CONSERVING FIXTURES: For all water consuming plumbing fixtures and fittings, submit manufacturer's cut sheets showing maximum flow rates and/or flush rates.

15. ENERGY SAVING APPLIANCES: Submit manufacturer's cut sheets and published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying the product's rating under the U.S. EPA/DOE Energy Star program, for all of the following:

    a. Appliances (i.e., refrigerators, dishwashers, microwave ovens, televisions, clothes washers, clothes dryers, chilled water dispensers).
    b. Office equipment (i.e., copy machines, fax machines, plotters/printers, scanners, binding and publishing equipment).
    c. Electronics (i.e., servers, desktop computers, computer monitor displays, laptop computers, network equipment).
    d. Commercial food service equipment.

16. GLAZING: For glazing in any windows, doors, storefront and window wall systems, curtainwall systems, skylights, and partitions, submit manufacturer's cut sheets indicating the following:

    a. Glazed area.
    b. Visible light transmittance.
    c. Solar heat gain coefficient.
    d. Fenestration assembly u-factor.

17. VENTILATION: Submit manufacturer's cut sheets for the following:
    a. Carbon dioxide monitoring systems, if any, installed to measure outside air delivery.
    b. Air filters: for detailed requirements refer to Section 01 81 19 INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS.
18. REFRIGERATION: For all refrigeration equipment, submit manufacturer's cut sheets indicating the following:
    a. Equipment type.
    b. Equipment life. Default values specified by the 2007 ASHRAE Applications Handbook will be used unless otherwise demonstrated by the manufacturer's guarantee and an equivalent long-term service contract.
    c. Refrigerant type.
    d. Refrigerant charge in pounds of refrigerant per ton of gross cooling capacity.
    e. Tested refrigerant leakage rate, in percent per year. A default rate of 2% will be used unless otherwise demonstrated by test data.
    f. Tested end-of-life refrigerant loss, in percent. A default rate of 10% will be used unless otherwise demonstrated by test data.

1.7 LEED BUILDING SUBMITTAL REQUIREMENTS:

A. The LEED Building Submittal information must be assembled into one package per contract specification section(s) (or per Subcontractor), and submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES. Incomplete or inaccurate LEED Building Submittals may be used as the basis for the rejection of products or assemblies.

B. All final LEED Building Submittal information with back-up documentation must be submitted within two (2) months of the Project's substantial completion. If in the Project's LEED review, the USGBC or their third party reviewer requires additional documentation as it relates to the LEED Building Submittals, the Contractor must provide the requested documentation within two (2) weeks.

1.8 LEED ACTION PLANS:

A. Construction Waste Management Plan- Refer to Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for detailed requirements.

B. Construction IAQ Management Plan- Refer to Section 01 81 19 INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS for detailed requirements.

C. Erosion and Sedimentation Control (ESC) Plan:
    1. The Plan must be in accordance with the New York State Department of Environmental Conservation (NYSDEC)'s New York State Standards and Specifications for Erosion and Sediment Control (Blue Book) or the 2012 EPA Construction General Permit, whichever is more stringent.
    2. The Plan must be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.
    3. Detailed requirements: ESC Plan
        a. Include the Stormwater Pollution Prevention Plan, if required.
        b. Identify the party responsible for Plan monitoring and documentation. The party must be regularly on site.
        c. Describe all site work that will be implemented on the Project and include timing of implementation.

d. Submit site plan with location of ESC measures, including, but not limited to, stormwater quantity controls, stormwater quality controls, stabilized construction entrances, washdown areas, inlet/catch basin protection and perimeter controls.
e. Establish and clearly delineate construction buffer zones to avoid soil compaction and other construction damage to greenfields.
f. Describe the inspection and maintenance protocols of the ESC measures. Submit a construction schedule indicating weekly site review.
g. Describe reporting and documentation measures.

4. Detailed requirements: ESC Tracking Log
   a. Note date of major rain events, describe damage, describe any repairs or maintenance of specific control measures performed, and note responsible party.
   b. Note date and findings of weekly site review, describe any repairs or maintenance performed, and note responsible party. Submit date-stamped photographs, inspection reports or other recording processes.
   c. Submit monthly.
5. Implementation
   a. Before Demolition and/or Construction begins, the Contractor will implement the ESC Plan, coordinate the Plan with all affected trades, and designate one individual as the Erosion and Sedimentation Control Representative, who will be responsible for communicating the progress of the Plan with the Commissioner monthly, and for assembling the required LEED documentation.
   b. The Contractor is responsible for the provision, maintenance, and repair of all ESC measures. Any problems identified in site inspections must be resolved in a timely manner.
   c. Demonstration. The Contractor must provide on-site instruction of proper construction practices required to prevent erosion and sedimentation.
   d. All Subcontractors must promptly notify the ESC Representative if damage to an ESC measure is observed.
   e. Meetings. Urgent or ongoing ESC issues must be discussed at weekly on-site job meetings.
6. All projects, including zero lot line buildings and projects that cause minimal or even no exterior site disturbance, must have ESC Plan that meets requirements.
7. Contractor must save such original documents for the life of the Project plus seven (7) years.

1.9 QUALITY ASSURANCE:

A. The Contractor must implement all LEED Action Plans, coordinate the Plans and LEED Building Submittals with all affected trades, and designate one individual as the Sustainable Construction Representative at no additional cost to the City of New York, who will be responsible for communicating the progress of LEED activities with the Commissioner monthly, and for assembling the required LEED documentation. The Contractor must facilitate measurements taken by authorized parties on site for LEED compliance verification purposes.

B. Responsibilities of Contractor's Subcontractors: The Contractor is responsible for its Subcontractors complying with the LEED Action Plans and for providing required LEED documentation as required for the Project.

C. Distribution and Compilation: The Contractor is responsible for distributing the LEED v4 MR Credits Calculator for Building Product Disclosure and Optimization, the LEED v4 EQ Credit Low-Emitting Materials Calculator, and any other forms or templates required for the Subcontractors to record LEED documentation. The Contractor is also responsible for collecting and compiling Building Product Disclosure and Optimization and Low-Emitting Materials information into packages as described in Section 01 33 00 SUBMITTAL PROCEDURES.

D. Meetings: Sustainable design and construction issues must be discussed at the following meetings in accordance with Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION:
   1. Demolition kick-off meeting

2. Construction kick-off meeting
3. Construction kick-off meeting for LEED (independent meeting)
4. Weekly job-site progress and coordination meetings
5. Closeout meeting

1.10 REFERENCES:

A. New York State Standards and Specifications for Erosion and Sediment Control, amended November 2016: http://www.dec.ny.gov/docs/water_pdf/2016nysstanec.pdf

B. 2012 EPA Construction General Permit: https://www.epa.gov/npdes/epas-2012-construction-general-permit-cgp-and-related-documents

C. South Coast Air Quality Management District (SCAQMD), Rule 1168: www.aqmd.gov

D. South Coast Air Quality Management District (SCAQMD), Rule 1113: www.aqmd.gov

E. CDPH Standard Method v1.1-2010: www.cal-iaq.org

F. ISO 17025: www.iso.org

G. ISO Guide 65: www.iso.org

H. CARB 93120 ATCM: arb.ca.gov/toxics/compwood/compwood.htm

I. ANSI/BIFMA M7.1 Standard Test Method for Determining VOC Emissions from Office Furniture Systems, Components and Seating: bifma.org

J. ANSI/BIFMA e3-2011 Furniture Sustainability Standard: bifma.org

K. ISO 14021–1999, Environmental labels and declarations—Self Declared Claims (Type II Environmental Labeling): www.iso.org

L. ISO 14025–2006, Environmental labels and declarations (Type III Environmental Labeling): www.iso.org

M. ISO 14040–2006, Environmental management, Life cycle assessment principles, and frameworks: www.iso.org

N. ISO 14044–2006, Environmental management, Life cycle assessment requirements, and guidelines: www.iso.org

O. International Standard ISO 21930–2007 Sustainability in building construction—Environmental declaration of building products: www.iso.org

P. Federal Trade Commission, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e): www.ftc.gov/bcp/grnrule/guides980427.htm

Q. Global Reporting Initiative (GRI) Sustainability Report: www.globalreporting.org/

R. Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises: www.oecd.org/daf/internationalinvestment/guidelinesformultinationalenterprises/

S. U.N. Global Compact, Communication on Progress: www.unglobalcompact.org/participation/report/cop

T. ISO 26000—2010 Guidance on Social Responsibility: www.iso.org/iso/home/standards/iso26000.htm

U. Forest Stewardship Council: www.ic.fsc.org

V. Sustainable Agriculture Network: www.sanstandards.org

W. The Rainforest Alliance: www.rainforest-alliance.org/

X. ASTM Test Method D6866: www.astm.org/Standards/D6866.htm

Y. Chemical Abstracts Service: www.cas.org/

Z. Health Product Declaration: www.hpd-collaborative.org/

AA. Cradle-to-Cradle CertifiedCM Product Standard: www.c2ccertified.org/product_certification

BB. Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH): www.echa.europa.eu/support/guidance-on-reach-and-clp-implementation

CC. GreenScreen: www.greenscreenchemicals.org/method/greenscreen-list-translator

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 81 13.04

SECTION 01 81 13.10
ENVIRONMENTALLY PREFERABLE PURCHASING (EPP) COMPLIANCE

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 81 13.10

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY:

A. This Section includes administrative and procedural requirements for all equipment, material and product purchasing to comply with the requirements of New York City Environmentally Preferable Purchasing (EPP) "Minimum Standards for Construction Products", as established by the Mayor's Office of Contract Services (MOCS). Refer to their website for further guidance.

B. All sections in the Project Specifications with applicable equipment, materials and products will follow all requirements of this section. In the event of any conflict or inconsistency between this section and the Specifications, the more stringent requirements will prevail.

C. This Section includes:

1. Definitions
2. Administrative Requirements
3. Action Submittals
4. Informational Submittals
5. Products, Materials

1.3 RELATED SECTIONS: Include without limitation the following:

A. Section 01 10 00 SUMMARY
B. Section 01 33 00 SUBMITTAL PROCEDURES
C. Section 01 78 39 CONTRACT RECORD DOCUMENTS

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Term	Definition
Environmentally Preferable Purchasing (EPP) Minimum Standards for Construction Products	The standard that refers to a list of equipment, materials and products that may be specified in construction contracts covered by the EPP laws and provides the applicable minimum standards referenced in the laws. See EPP Minimum Standards for Constructions Products available on MOCS' website for a comprehensive list of all applicable definitions.

1.5 ADMINISTRATIVE REQUIREMENTS:

A. At no additional cost to the City of New York, designate an individual who will be responsible for the communication of progress of EPP activities with the Commissioner on a regular basis and for the quality of all EPP-related materials and preparation, coordination and assembly of the supporting documentation.

B. Scope and Applicability: Action submittals and informational submittals are required for all installed equipment, materials and products that require EPP compliance. Provide all required submittals in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

C. Distribution and Compilation: The Contractor must coordinate with all affected trades and is responsible for its Subcontractors complying with the EPP requirements and for providing required EPP documentation as required for the project. The Contractor is responsible for distributing the forms or templates required for the Subcontractors to record EPP documentation. The Contractor is also responsible for collecting and compiling information into packages as described in Section 01 33 00 SUBMITTAL PROCEDURES.

D. The Contractor must respond in a timely manner to questions and requests from the Commissioner, Design Consultant and MOCS regarding EPP requirements that are the responsibility of the Contractor. Document responses as informational submittals.

1.6 ACTION SUBMITTALS:

A. General Requirements:

1. EPP Documentation Submittals for applicable and compliant product data, as stated in the EPP Minimum Standards for Construction Products, is to be documented in the form of a Vendor Survey and supporting manufacturer's data sheets highlighting EPP compliance-related data. Include in the Vendor Survey the anticipated quantity of product purchased and cost per unit data. See attached sample Vendor Survey form.

2. Compliance with EPP requirements will be used as one criterion to evaluate product selection. Assemble EPP Documentation Submittal information into one package per contract specification section(s) (or per Subcontractor). Incomplete or inaccurate EPP Documentation submittals may be used as the basis for the rejection of products or assemblies.

3. Update the quantities and costs in the Vendor Survey once products are approved and purchased and document as information submittal.

1.7 INFORMATIONAL SUBMITTALS

A. For each registered contract, the Contractor must maintain a Master Vendor Survey, an updated tracking log of all equipment, materials and products purchased on a contract that are required to comply with EPP. Submit the Master Vendor Survey on a monthly basis and update the costs once products are purchased.

1. Upon request by MOCS, submit the Master Vendor Survey and supporting documents.

B. EPP Progress Reports: Concurrent with each Application for Payment, submit reports of purchasing activities for each of the EPP-applicable equipment, materials and products listed in Sub-section C below.

C. Project Materials Cost Data: For Vendor Survey and EPP Progress Reports, include breakout of costs for the following categories of items:

1. Appliances.
2. Architectural Coatings.
3. HVAC Equipment.
4. Lighting Products.
5. Miscellaneous Products – Construction.
6. Plumbing Fixtures.

PART II – PRODUCTS

2.1 MATERIALS:

A. Detailed Requirements. This sub-section defines the information and documents to be provided for each EPP-applicable equipment, material and product type, as identified in each specification section:

1. Appliances – Residential:

   All energy-using products for which the United States Environmental Protection Agency and the United States Department of Energy have developed energy efficiency standards for compliance with the Energy Star program shall be ENERGY STAR labeled. The following residential appliances shall comply with this requirement:

   a. Clothes Washers
   b. Dehumidifiers
   c. Dishwashers, Standard-Sized
   d. Freezers, Upright, Chest and Compact
   e. Refrigerators and Refrigerator-Freezers, Standard-Sized and Compact

   Microwave Ovens shall comply with the following requirements:

   a. Recommended Standby Levels: 2 watts or less
   b. Best Available Standby Level: 2 watts or less

2. Architectural Coatings:

   a. For the products listed below, the maximum content of Volatile Organic Compounds (VOCs) shall be determined according to the American Society for Testing and Materials test method D 5116 (Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products).

Architectural Coating	**Maximum Concentration of VOC in Grams per Liter**
Clear Wood Coating – Clear-Brushing lacquers	275
Clear Wood Coating – Sanding Sealers (Other than Lacquers)	275
Clear Wood Coating –Varnishes	275
Floor Coatings	100
Lacquers - Pigmented	275
Primers for Flat Paint	100
Primers for Non-Flat Paint	150
Rust Preventative/Anti-Corrosive Paint	250

b. Any product listed below that is compliant with Part 205 of Title Six of the New York Codes, Rules and Regulations meets the standard required under EPP Minimum Standards for Construction Products. The maximum content of VOCs for these products shall be determined according to the test method required under part 205.6 of such part.

Architectural Coating	**Maximum Concentration of VOC in Grams per Liter**
Clear Wood Coating – Conversion Varnishes	725
Clear Wood Coating – Lacquers (Including Lacquer Sanding Sealers)	550
Concrete Bond Breakers	350
Concrete Curing Compounds	350
Concrete Surface Retarders	780
Dry Fog Coatings	400
Faux Finishing Coatings	350
Fire-Resistive Coatings	350
Fire-Retardant Coatings	650
Fire-Retardant Coatings - Opaque	350
Flat Paint	100
Form Release Compounds	250
Graphic Arts Coatings (Sign Paints)	500
High Temperature Coatings	420
Industrial Maintenance (IM) Coatings	340
Low Solids Coatings	120
Magnesite Cement Coatings	450
Mastic Texture Coatings	300
Metallic Pigmented Coatings	500
Multi-Color Coatings	500
Nonflat High-Gloss Coatings	250
Nonflat Paint	150
Pre-Treatment Wash Primers	420
Primers, Sealers, and Undercoaters	200
Quick-Dry Enamels	250
Quick-Dry Primers, Sealers, and Undercoaters	200
Recycled Coatings	250
Roof Coatings	250
Roof Coatings (Bituminous)	300
Roof Primers (Bituminous)	350
Shellacs – Clear	730
Shellacs – Opaque	550
Specialty Primers, Sealers and Undercoaters	350
Stains	250
Swimming Pool Coatings and Swimming Pool Repair and Maintenance Coatings	340
Thermoplastic Rubber Coatings and Mastics	550
Waterproofing Concrete / Masonry Sealers	400
Waterproofing Sealers	250
Wood Preservatives	350

c. The products listed below shall be recovered material and comply with the Post-consumer Content and Total Recovered Materials Content requirements.

Architectural Coating	Post-consumer Content (%)	Total Recovered Materials Content (%)
Latex Paint – Consolidated	100	100
Latex Paint – Reprocessed White, Off-White and Pastel Colors	20	20
Latex Paint – Reprocessed Grey, Brown, Earthtones and Other Dark Colors	50-99	50-99

3. HVAC Equipment: Commercial and Residential

a. Commercial

All energy-using products for which the United States Environmental Protection Agency and the United States Department of Energy have developed energy efficiency standards for compliance with the Energy Star program shall be ENERGY STAR labeled. The following Commercial HVAC Equipment shall comply with this requirement:

1. Air Conditioners, Air-Cooled
2. Air Conditioners, Gas/Electric Package Units
3. Heat Pumps, Air Source

Chillers shall comply with the following Part Load Optimized Chillers IPLV and Full Load Optimized Chillers IPLV requirements:

Type	Compressor Type and Capacity	Part Load Optimized Chillers IPLV (kW/ton) Required	Full Load Optimized Chillers IPLV (kW/ton) Required
Air-Cooled	Scroll (30 – 60 tons)	0.86 or less	1.23 or less 1.1
Air-Cooled	Reciprocating (30 – 150 tons)	0.90 or less	1.23 or less 1
Air-Cooled	Screw (70 – 200 tons)	0.98 or less	1.23 or less 0.94
Water-Cooled	Centrifugal (150 – 299 tons)	0.52 or less	0.59 or less
Water-Cooled	Centrifugal (300 – 2,000 tons)	0.45 or less	0.56 or less
Water-Cooled	Rotary Screw (>150 tons)	0.49 or less	0.64 or less

b. Residential

All energy-using products for which the United States Environmental Protection Agency and the United States Department of Energy have developed energy efficiency standards for compliance with the Energy Star program shall be ENERGY STAR labeled. The following Residential HVAC Equipment shall comply with this requirement:

1. Air Conditioners, Central (<65,000 Btu/h)

2. Air Conditioners, Central, Gas/Electric Package Units (<65,000 Btu/h)
3. Air Source Heat Pumps (<65,000 Btu/h)
4. Boilers and Boiler/Hot Water Heaters (<300,000 Btu/h)
5. Ceiling Fans
6. Furnaces and Furnace/Hot Water Heaters (<340,000 Btu/h)
7. Ground Source Heat Pumps (Geothermal)
8. In-Line Ventilating Fan
9. Programmable Thermostats
10. Range Hood and Bathroom /Utility Room Ventilating Fans
11. Room Air Cleaners
12. Room Air Conditioners

4. Lighting Products

a. The following lighting products shall comply with the corresponding BEF requirement:

Product Type	**Number of Lamps**	**Required BEF**
Ballast, Fluorescent, Four-Foot, Linear T12, 34-Watts	1	2.64 or higher
Ballast, Fluorescent, Four-Foot, Linear T12, 34-Watts	2	1.41 or higher
Ballast, Fluorescent, Four-Foot, Linear T12, 34-Watts	3	0.93 or higher
Ballast, Fluorescent, Eight-Foot, Linear T12, 60-Watts	2	0.80 or higher
Ballast, Fluorescent, Four-Foot, Linear T8, 32-Watts	1	2.54 or higher
Ballast, Fluorescent, Four-Foot, Linear T8, 32-Watts	2	1.44 or higher
Ballast, Fluorescent, Four-Foot, Linear T8, 32-Watts	3	1.44 or higher
Ballast, Fluorescent, Four-Foot, Linear T8, 32-Watts	4	0.73 or higher
Ballast, Fluorescent, Eight-Foot, Linear T8, 59-Watts	2	0.80 or higher
Ballast, Fluorescent, Four-Foot, U-Bent T12, 34-Watts	1	2.64 or higher
Ballast, Fluorescent, Four-Foot, U-Bent T12, 34-Watts	2	1.41 or higher
Ballast, Fluorescent, Four-Foot, U-Bent T12, 34-Watts	3	0.93 or higher
Ballast, Fluorescent, U-Tube, U-Bent T8, 32-Watts	1	2.54 or higher
Ballast, Fluorescent, U-Tube, U-Bent T8, 32-Watts	2	1.44 or higher
Ballast, Fluorescent, U-Tube, U-Bent T8, 32-Watts	3	0.93 or higher
Ballast, Fluorescent, U-Tube, U-Bent T8, 32-Watts	4	0.73 or higher

b. All energy-using products for which the United States Environmental Protection Agency and the United States Department of Energy have developed energy efficiency standards for compliance with the Energy Star program shall be ENERGY STAR labeled. The following Lighting Products shall comply with this requirement:

1. Exit Signs
2. Luminaires, Residential

c. Luminaires, Downlight, With Compact Fluorescent Lamps (13-32 Lamp Wattage) shall comply with the following LER requirements:

Luminaire Type (NEMA Designation)	Required LER
Open Optics	29 or higher
Baffled Optics	21 or higher
Lensed Optics	24 or higher

d. Luminaires, Downlight, With Metal Halide Lamps (<150 Watts) shall comply with the following LER requirements:

Luminaire Type (NEMA Designation)	Required LER
Open Optics	35 or higher
Lensed Optics	30 or higher

e. Luminaires, Fluorescent shall comply with the following LER requirements:

Luminaire Type (NEMA Designation)	Number of Lamps	Required LER
Lensed (FL)	2	62 or higher
Lensed (FL)	3	61 or higher
Lensed (FL)	4	61 or higher
VDT-Preferred Louvered (FP)	2	50 or higher
VDT-Preferred Louvered (FP)	3	51 or higher
VDT-Preferred Louvered (FP)	4	54 or higher
Four-Foot (FW)	2	63 or higher
Four-Foot (FW)	4	62 or higher
Four-Foot (FS)	1	70 or higher
Four-Foot (FS)	2	70 or higher
Four-Foot (FI)	1	67 or higher
Eight-Foot (FI)	2	68 or higher

f. Luminaires, Industrial HID, With High Pressure Sodium Lamps (<150 Lamp Wattage) shall comply with the following LER requirements:

Upward Efficiency	Lamp Wattage	Closed Fixture (HR) LER Required	Open Fixture (HR) LER Required
0%	150-399	58 or higher	68 or higher
0%	400-999	63 or higher	84 or higher
0%	>1000	N/A	N/A
1%-10%	150-399	64 or higher	63 or higher
1%-10%	400-999	82 or higher	89 or higher
1%-10%	>1000	N/A	109 or higher
11%-20%	150-399	N/A	78 or higher

11%-20%	400-999	N/A	94 or higher
11%-20%	>1000	N/A	N/A
>20%	150-399	75 or higher	77 or higher
>20%	400-999	N/A	N/A
>20%	>1000	N/A	N/A

5. Miscellaneous Products – Construction

a. For the products listed below, the maximum content of Volatile Organic Compounds (VOCs) shall be determined according to the American Society for Testing and Materials test method D 5116 (Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products). The products may not contain any volatile organic compound in any concentration exceeding that specified below. Products that are compliant with the Green Label Plus program of the Carpet and Rug Institute are also compliant with this standard.

Carpet Adhesives		
Volatile Organic Compound	**24-Hour Testing Maximum Emission Factor (µg/m2•hr)**	**14-Day Testing Maximum Emission Factor (µg/m2•hr)**
Formaldehyde	50	31
2-ethyl-1-hexanol	300	300
Total Volatile Organic Compounds	800	N/A
Carpet Cushions		
Volatile Organic Compound	**24-Hour Testing Maximum Emission Factor (µg/m2•hr)**	**14-Day Testing Maximum Emission Factor (µg/m2•hr)**
Butylated Hydroxytoluene	300	N/A
Formaldehyde	50	N/A
4-Phenylcyclohexene (4PCH)	50	N/A
Total Volatile Organic Compounds	1000	N/A
Carpets		
Volatile Organic Compound	**24-Hour Testing Maximum Emission Factor (µg/m2•hr)**	**14-Day Testing Maximum Emission Factor (µg/m2•hr)**
Formaldehyde	50	30
4-Phenylcyclohexene	50	17
Styrene	410	410
Total Volatile Organic Compounds	500	N/A

b. The products listed below shall comply with the Recycled Post-consumer Content and Total Recovered Materials Content requirements.

Carpet Cushion – Bonded Polyurethane		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Old Carpet Cushion	15-50	15-50
Carpet Cushion – Jute		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Burlap	40	40
Carpet Cushion – Rubber		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Tire Rubber	60-90	60-90
Carpet Cushion – Synthetic Fibers		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Carpet Fabrication Scrape	No Range Recommended	100
Cement and Concrete		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Cenospheres	No Range Recommended	Minimum 10% (by volume)
Coal fly Ash	No Range Recommended	No Range Recommended
GGBF Slag	No Range Recommended	No Range Recommended
Silica Fume	No Range Recommended	5-10% of cementitious material (dry weight basis)
Channelizers		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Plastic	25-90	No Range Recommended
Rubber (base only)	100	No Range Recommended
Delineators – Fixed		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Plastic	25-90	No Range Recommended
Rubber (base only)	100	No Range Recommended
Steel (BOF, base only)	16	25-30
Steel (BOF, base only)	67	100
Delineators – Flexible		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Plastic PET	25-85	No Range Recommended
Floor Tiles		
Material	Recovered Post-consumer Content (%)	Total Recovered Materials Content (%)
Rubber	90-100	No Range Recommended
Plastic	No Range Recommended	90-100
Insulation - Cellulose		

Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Post-consumer Paper	75	75
Insulation - Foam-In-Place		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Recovered Material	No Range Recommended	5
Insulation - Glass Fiber Reinforced		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Recovered Material	No Range Recommended	6
Insulation - Laminated Paperboard		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Post-consumer Paper	100	100
Insulation - Perlite Composition Board		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Post-consumer Paper	23	23
Insulation - Phenolic Rigid Foam	**Insulation - Phenolic Rigid Foam**	**Insulation - Phenolic Rigid Foam**
Material	**Material**	**Material**
Recovered Material	Recovered Material	Recovered Material
Insulation - Plastic, Non-woven Batt	**Insulation - Plastic, Non-woven Batt**	**Insulation - Plastic, Non-woven Batt**
Material	**Material**	**Material**
Recovered and/or Post-consumer Plastic	Recovered and/or Post-consumer Plastic	Recovered and/or Post-consumer Plastic
Insulation - Plastic Rigid Foam, Polyisocyanurate/Polyurethane: Rigid Foam	**Insulation - Plastic Rigid Foam, Polyisocyanurate/Polyurethane: Rigid Foam**	**Insulation - Plastic Rigid Foam, Polyisocyanurate/Polyurethane: Rigid Foam**
Material	**Material**	**Material**
Recovered Material	Recovered Material	Recovered Material
Insulation - Structural Fiberboard	**Insulation - Structural Fiberboard**	**Insulation - Structural Fiberboard**
Material	**Material**	**Material**
Recovered Material	Recovered Material	Recovered Material
Modular Threshold Ramps	**Modular Threshold Ramps**	**Modular Threshold Ramps**
Material	**Material**	**Material**
Steel (BOF)	Steel (BOF)	Steel (BOF)
Steel (EAF)	Steel (EAF)	Steel (EAF)
Aluminum	Aluminum	Aluminum
Rubber	Rubber	Rubber

Nonpressure Pipe		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Steel (BOF)	16	25-30
Steel (EAF)	67	100
Plastic (HDPE)	100	100
Plastic (PVC)	5-15	25-100
Cement	No Range Recommended	No Range Recommended
Playground Equipment		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Plastic	90-100	100
Plastic Composite	50-75	95-100
Steel (BOF)	16	95
Steel (EAF)	50-100	95-100
Restroom Dividers/Partitions, Steel		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Steel (from BOF)	16	25-30
Steel (from EAF)	67	100
Roofing Materials		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Steel (BOF)	16	25-30
Steel (EAF)	67	100
Aluminum	20-95	20-95
Fiber (felt) or Fiber Composite	50-100	50-100
Rubber	12-100	100
Plastic or Plastic/Rubber Composite	100	100
Wood/Plastic Composite	No Range Recommended	100
Cement	No Range Recommended	No Range Recommended
Shower Dividers/Partitions, Steel		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Steel (from BOF)	16	25-30
Steel (from EAF)	67	100
Traffic Barricades		
Material	**Recovered Post-consumer Content (%)**	**Total Recovered Materials Content (%)**
Plastic (High Density Polyethylene [HDPE], Low-Density Polyethylene [LDPE], Polyethylene terephthalate [PET])	80-100	100
Steel (BOF)	16	25-30
Steel (EAF)	67	100
Fiberglass	No Range Recommended	No Range Recommended

c. All energy-using products for which the United States Environmental Protection Agency and the United States Department of Energy have developed energy efficiency standards for compliance with the Energy Star program shall be ENERGY STAR labeled. The following Construction Products shall comply with this requirement:

1. Entry or Patio Doors, Residential
2. Residential Skylights
3. Residential Windows & Tubular Daylighting Devices
4. Roof Products

d. Electric Motors shall comply with the following Nominal Efficiencies requirements:

Nominal Efficiencies for Induction Motors Rated 600 Volts or Less (Random Wound)						
Motor Size (HP)			**Open Drip-Proof (ODP)**		**Totally Enclosed Fan-Cooled (TEFC)**	
6-pole (1200 rpm)	**4-pole (1200 rpm)**	**2-pole (1200 rpm)**	**6-pole (1200 rpm)**		**4-pole (1200 rpm)**	**2-pole (1200 rpm)**
1	82.5	85.5	77.0	82.5	85.5	77.0
1.5	86.5	86.5	84.0	87.5	86.5	84.0
2	87.5	86.5	85.5	88.5	86.5	85.5
3	88.5	89.5	85.5	89.5	89.5	86.5
5	89.5	89.5	86.5	89.5	89.5	88.5
7.5	90.2	91.0	88.5	91.0	91.7	89.5
10	91.7	91.7	89.5	91.0	91.7	90.2
15	91.7	93.0	90.2	91.7	92.4	91.0
20	92.4	93.0	91.0	91.7	93.0	91.0
25	93.0	93.6	91.7	93.0	93.6	91.7
30	93.6	94.1	91.7	93.0	93.6	91.7
40	94.1	94.1	92.4	94.1	94.1	92.4
50	94.1	94.5	93.0	94.1	94.5	93.0
60	94.5	95.0	93.6	94.5	95.0	93.6
75	94.5	95.0	93.6	94.5	95.4	93.6
100	95.0	95.4	93.6	95.0	95.4	94.1
125	95.0	95.4	94.1	95.0	95.4	95.0
150	95.4	95.8	94.1	95.8	95.8	95.0
200	95.4	95.8	95.0	95.8	96.2	95.4
250	95.4	95.8	95.0	95.8	96.2	95.8
300	95.4	95.8	95.4	95.8	96.2	95.8
350	95.4	95.8	95.4	95.8	96.2	95.8
400	95.8	95.8	95.8	95.8	96.2	95.8
450	96.2	96.2	95.8	95.8	96.2	95.8
500	96.2	96.2	95.8	95.8	96.2	95.8

Nominal Efficiencies for Induction Motors Rated Medium Voltage or Less (Form Wound)					
Motor Size (HP)		**Open Drip-Proof (ODP)**		**Totally Enclosed Fan-Cooled (TEFC)**	
6-pole (1200 rpm)	**4-pole (1200 rpm)**	**2-pole (1200 rpm)**	**6-pole (1200 rpm)**	**4-pole (1200 rpm)**	**2-pole (1200 rpm)**
250-500	95.0	95.0	94.5	95.0	95.0	95.0

6. Plumbing Fixtures.
   a. The plumbing fixtures shall comply with the following Water Efficiency requirements:

Plumbing Fixture	**Water Efficiency Requirement**
Lavatory Faucets	< 2.0 gallons per minute
Showerheads, Residential and Commercial	< 2.2 gallons per minute
Toilets, Residential and Commercial	< 1.6 gallons per flush
Urinals, Residential and Commercial	< 1.0 gallons per flush

PART III – EXECUTION (Not Used)

END OF SECTION 01 81 13.10

EPP VENDOR SURVEY FORM

Instructions: In the space provided, indicate the following: (1.) Choose Construction for the EPP Book Used (2.) Choose the product type from the drop-down menu; (3.) Choose the product detail from the drop-down menu; (4.) Identify the specific item under Product Description; (5.) Enter the number of products per unit; (6.) Enter the cost per unit; (7.) Enter the units purchased; (8.) Enter the total cost.

Return completed spreadsheet to the contracting agency in the accompanying letter. Thank you.

Agency Acronym	Environmental Preferable Purchasing Information				Quantity and Cost Information				
	EPP Book Used	Product Type	Product Details	Product Description	Products Per Unit	Cost Per Unit	Units Purchased	Total Cost	Comments
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
DDC								$0.00	
TOTAL					0.00	$0.00	0.00	$0.00	

SECTION 01 81 19
INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 81 19

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 CONSTRUCTION IAQ MANAGEMENT GOALS FOR THE PROJECT:

A. The City of New York has determined that this Project must minimize the detrimental impacts on Indoor Air Quality (IAQ) resulting from construction Subcontractor activities. Factors that contaminate indoor air, such as dust entering HVAC systems and ductwork, improper storage of materials on-site, and poor housekeeping, must be minimized.

1.3 RELATED SECTIONS:

A. All sections of the Specifications related to interior construction, MEP systems and items affecting indoor air quality.

B. Division 9 (of the Specifications): Finishes.

C. Refer to the Addendum to identify whether this project is designed to comply with a Certification Level according to the U.S. Green Building Council's LEED Rating System, as specified in Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS.

D. Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS.

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
Volatile Organic Compounds (VOCs)	Chemical compounds common in and emitted by many building products, including solvents in paints, coatings, adhesives and sealants, wood preservatives, composite wood binder, and foam insulations. Not all VOCs are harmful, but many of those contained within building products contribute to the formation of smog and may irritate building occupants by their smell or health impact.
Materials that act as "sinks" for VOC contamination	Absorptive materials, typically dry and soft materials (such as textiles, carpeting, acoustical ceiling tiles and gypsum board) that readily absorb VOCs emitted by "source" materials and release them over a prolonged period of time.

Materials that act as "sources" for VOC contamination	Products with high VOC contents that emit VOCs either rapidly during application and curing (typically "wet" products, such as paints, sealants, adhesives, caulks and sealers) or over a prolonged period (typically "dry" products such as flooring coverings with plasticizers and engineered wood with formaldehyde).

1.5 REFERENCES, RESOURCES:

A. "IAQ Guidelines for Occupied Buildings Under Construction", Second Edition, 2007, The Sheet Metal and Air Conditioner Contractors National Association (SMACNA). (703) 803-2980, www.smacna.org.

B. ANSI/ASHRAE 52.2-2007, "Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size", www.ashrae.org.

1.6 LEED BUILDING GENERAL REQUIREMENTS:

A. Implement practices and procedures as necessary to meet the Project's environmental performance goals as set forth in the specific requirements of this section. Specific Project goals that may impact this area of work include: use of recycled-content materials; use of low-emitting materials; construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in this section, are implemented to the fullest extent. Substitutions or other changes to the work will not be allowed if such changes compromise the stated LEED building performance criteria.

1.7 CONSTRUCTION IAQ MANAGEMENT PLAN:

A. The Contractor must prepare a Construction IAQ Management Plan in coordination with each Subcontractor and submit the Construction IAQ Management Plan to the Commissioner for approval in accordance with Section 01 33 00 SUBMITTAL PROCEDURES. The Construction IAQ Management Plan must meet the following criteria:

1. Construction activities must be planned to meet or exceed the minimum requirements of SMACNA's "IAQ Guidelines for Occupied Buildings under Construction", Second Edition, 2007.

2. Absorptive materials must be protected from moisture damage when stored on-site and after installation.

3. The planned operation of air handlers during construction must be described. If air handlers are to be used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grille and return or transfer duct inlet opening, such that there is no bypass around the filtration media, as determined by ASHRAE 52.2-2007.

4. Filtration media must be replaced immediately prior to occupancy. Filtration media must have a MERV of 13 as determined by ASHRAE 52.2-2007.

5. A sequence of finish installation plan "Plan" must be developed, highlighting measures to reduce the absorption of VOCs by materials that act as "sinks".

6. The use of tobacco products is prohibited inside the building and within 25 feet of the building entrance during construction.

7. A flush-out or air testing must be performed.

8. Upon approval of the finish installation plan by the Commissioner, it must be implemented by the Contractor through the duration of the construction process, and documented in accordance with the Submittal Requirements of Sub-Section 1.8 herein.

B. Detailed requirements of the Construction IAQ Management Plan are as follows:

1. SMACNA Guidelines: Chapter 3 of the referenced "IAQ Guidelines for Occupied Buildings Under Construction", outline IAQ measures in five categories as listed below. The Construction IAQ Management Plan must be organized in accordance with the SMACNA format, and must address measures to be implemented in each of the five categories (including subsections). All subsections must be listed in the Plan; items that are not applicable for this Project should be listed as such.

   a. HVAC Protection

      1) Protect air handling, distribution equipment and air supply, and return ducting during construction.

      2) All ductwork arriving on site will be sealed with plastic sheeting and stored on pallets or dunnage until installed.

      3) Cover and protect all exposed air inlets and outlets, openings, grilles, ducts, plenums, etc. to prevent water, moisture, dust and other contaminant intrusion.

      4) Apply protection immediately after ducting.

      5) Protect ducting runs at the end of day's work.

      6) Inspect temporary filtration weekly and replace as required to maintain the proper ventilation rates in the building.

      7) To reduce debris and contamination to mechanical systems, do not store materials in mechanical rooms.

   b. Source Control

      1) Protect stored on-site or installed absorptive or porous materials. Store materials in dry conditions indoors, under cover, and off the ground or floor.

      2) Do not use wet or damaged porous materials in the building. Materials which become contaminated through direct exposure to moisture from precipitation, plumbing leaks, or condensation must be replaced by the Contractor, at no additional cost to the City of New York.

      3) Use low-toxicity and low-VOC materials to the greatest extent possible.

      4) Recover, isolate, and ventilate containers housing toxic materials and materials with VOC levels above the limits for interior adhesives, sealants, paints, and coatings described in these Specifications.

      5) Prevent exhaust fumes from idling vehicles, equipment and fossil-fueled tools from entering the building.

      6) Containers housing toxic materials and materials with VOC levels above the limits for interior adhesives, sealants, paints, and coatings described in these Specifications, must be closed when not in use.

      7) Enforce the no-smoking job site policy.

   c. Pathway Interruption

      1) Depressurize work areas which contain dust and odors.

      2) Pressurize occupied spaces to prevent intrusion of dust and odors.

      3) Erect barriers to contain construction areas.

      4) Relocate pollutant sources.

      5) Temporarily seal the building and provide 100% outside air for ventilation.

6) Provide walk-off mats at entryways to reduce introduced dirt and pollutants.

7) Use dust guards and collectors on saws and other tools.

d. Housekeeping

1) Store materials on elevated platforms under cover, in a designated dry, clean location, prior to unpacking for installation.

2) If materials are not stored in an enclosed location, cover tops and sides of material with waterproof sheeting, securely tied.

3) Institute cleaning activities to remove contaminants from the building prior to occupancy. Clean all coils, air filters and ductwork prior to performing testing, adjusting and balancing of HVAC systems.

4) Sweep the work area on a daily basis. Use an efficient and effective dust collecting method such as damp cloth, wet mop, or vacuum with high-efficiency particulate filters. Activities which produce high levels of dust must be cleaned up immediately upon completion.

5) Spills or excess applications of products containing solvents, or with VOC levels above the limits for interior adhesives, sealants, paints and coatings described in these Specifications, must be removed immediately.

6) Dust all walls prior to application of finishes.

7) Vacuum all stud tracks prior to application of insulation.

8) Keep materials organized to improve job safety as well as indoor air quality.

e. Scheduling

1) Phase construction such that absorptive materials are installed only in areas that are weathertight.

2) Schedule activities that utilize “sources” of VOC contamination to take place prior to installing high absorbent materials that will act as “sinks” for contaminants.

3) Review of the appropriate components of the Construction IAQ Management Plan must be a regular action topic at weekly site coordination meetings. Implementation of the Plan must be documented in the meeting minutes.

2. Protection of Materials from Moisture Damage: As part of the “Source Control” section of the Construction IAQ Management Plan, measures to prevent installed materials or material stored on-site from moisture damage must be described. This section must also describe corrective measures to be taken if moisture damage does occur to absorptive materials during the course of construction (see Section 1.7 B.1.b).

3. Replacement of Filtration Media: Under the “HVAC Protection” section of the Construction IAQ Management Plan, a description of the filtration media in all ventilation equipment must be provided. The description must include replacement criteria for filtration media during construction, and confirmation of filtration media replacement for all equipment immediately prior to occupancy.

4. Sequence of Finish Installation for Materials: Where feasible, absorptive materials must be installed after the installation of materials or finishes which have high short-term emissions of VOCs, formaldehyde, particulates, or other air-borne compounds. Absorptive materials include, but are not limited to: carpets; acoustical ceiling panels; fabric wall coverings; insulations (exposed to the airstream); upholstered furnishings; and other woven, fibrous or porous materials. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paints, wood preservatives and finishes;

control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.

5. Pre-Occupancy Phase: Perform either a flush-out or air sample testing (Options 1 or 2, respectively), as follows:

a. OPTION 1 — Flush-Out

1) Perform flush-out using either Path 1 or Path 2.

i. Path 1: After construction ends, prior to occupancy and with all interior finishes installed, install new filtration media and perform a building flush-out by supplying a total air volume of 14,000 cu.ft. of outdoor air per sq.ft. of floor area while maintaining an internal temperature of at least 60 degrees F and no higher than 80 degrees F and relative humidity no higher than 60%.

ii. Path 2: If occupancy is desired prior to completion of the flush-out, the space may be occupied following delivery of a minimum of 3,500 cu.ft. of outdoor air per sq.ft. of floor area to the space. Once a space is occupied, it must be ventilated at a minimum rate of 0.30 cfm/sq.ft. of outside air or the design minimum outside air rate determined in IEQ Prerequisite: Minimum Indoor Air Quality Performance, whichever is greater. During each day of the flush-out period, ventilation must begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions must be maintained until a total of 14,000 cu.ft./sq.ft. of outside air has been delivered to the space.

2) Commissioning can occur during flush-out, at the discretion of the Commissioner, provided none of the commissioning procedures introduce contaminants into the space and none of the flush-out procedures circumvent the commissioning process. Complete testing and balancing of the HVAC system after the flush-out is complete. Refer to Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS.

3) If even partial construction work occurs during the flush-out, the flush-out must be started again from the beginning for that space. If multiple, discrete HVAC systems operate independently, flush-out may be completed in portions of the building as work is completed in each area served by a given system.

OR

b. OPTION 2 — Air Testing

1) Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with current versions of the United States Environmental Protection Agency “Compendium of Methods for the Determination of Air Pollutants in Indoor Air” or ISO methods, as additionally detailed in the USGBC “LEED BD+C Reference Guide.”

2) Demonstrate that the contaminant maximum concentrations listed below are not exceeded.

CONTAMINANT	MAXIMUM CONCENTRATION
Formaldehyde	27 parts per billion
Particulates (PM10 for all buildings; PM25 for buildings in EPA nonattainment areas, or local equivalent)	PM10: 50 micrograms per cubic meter PM25: 15 micrograms per cubic meter

Ozone (for buildings in EPA nonattainment areas)	0.075 parts per million
Total Volatile Organic Compounds (TVOC)	500 micrograms per cubic meter
Target chemicals listed in the California Department of Public Health (CDPH) Standard Method c1.1, Table 4-1, except formaldehyde	CDPH Standard Method v1.1-2010, Allowable Concentrations, Table 4-1
Carbon Monoxide (CO)	9 part per million and no greater than 2 parts per million above outdoor levels

3) The air sample testing must be conducted as follows:

i. All measurements must be conducted prior to occupancy, but during normal occupied hours and with the building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.

ii. The building must have all interior finishes installed, including but not limited to millwork, doors, paint, carpet and acoustic tiles. Non-fixed furnishings such as workstations and partitions are required to be in place for the testing.

iii. Prior to air sample testing, all punch-list items that would generate VOCs or other contaminants, the testing and balancing of the HVAC system and finalization of all cleaning must be completed. Use low-emitting cleaning products and vacuum cleaners with HEPA filtration.

iv. The number of sampling locations will vary depending upon the size of the building and number of ventilation systems. For each portion of the building served by a separate ventilation system, the number of sampling points must not be less than one per 25,000 sq.ft., or for each contiguous floor area, whichever is larger, and include areas with the least ventilation and greatest presumed source strength.

v. Air samples must be collected between 3 feet and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum 4-hour period.

vi. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting non-complying building areas, take samples from the same locations as in the first test.

6. Implementation and Coordination: Before Demolition and/or Construction begins, the Contractor must implement the Construction IAQ Management Plan, coordinate the Construction IAQ Management Plan with all affected trades, and designate one individual as the Construction IAQ Representative at no additional cost to the City of New York, who will be responsible for communicating the progress of the Construction IAQ Management Plan with the Commissioner monthly and for assembling the required LEED documentation. Include provisions in the Construction IAQ Management Plan for addressing conditions in the field that do not adhere to the Plan, including provisions to implement a stop work order or to rectify non-compliant conditions.

a. Distribution: The Contractor must distribute copies of the Construction IAQ Management Plan in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

b. Instruction: The Contractor must provide on-site instruction of appropriate site management to all Contractor's Subcontractors.

c. Monitoring: The Construction IAQ Representative must monitor the implementation of the Construction IAQ Management Plan.

1.8 SUBMITTALS:

A. Submit the following LEED-required records and documents in accordance with Section 01 33 00 SUBMITTAL PROCEDURES and, Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS.

B. A copy of the Construction IAQ Management Plan as defined in Sub-Section 1.7 herein.

C. IAQ Tracking Log
   1. Note date of observed major Construction IAQ issues, describe any damage, describe any repairs or maintenance of specific control measures performed and note responsible party.
   2. Note date and findings of weekly site review, describe any repairs or maintenance performed, and note responsible party. Provide date-stamped photographs, inspection reports or other recording processes.
   3. Submit log monthly.

D. Product cut-sheets for all filtration media used during construction and installed immediately prior to occupancy, with MERV values highlighted. Cut sheets must be submitted with the Contactor's or Subcontractor's "approved" stamp as confirmation that the products are the products installed on the Project.

E. PHOTOGRAPHS: Submit to the Commissioner a minimum of 18 photographs as required under the provision for special photographs, in accordance with Section 01 32 33 PHOTOGRAPHIC DOCUMENTATION, comprised of at least six photographs taken on three different occasions during construction of each IAQ measure. The photographs must document the implementation of the Construction IAQ Management Plan throughout the course of the Project construction. Examples include photographs of ductwork sealing and protection, temporary ventilation measures, and conditions of on-site materials storage (to prevent moisture damage). Photographs must include integral date stamping, and must be submitted with brief descriptions of the Construction IAQ Management Plan measure documented, or be referenced to Project meeting minutes or similar Project documents which reference to the Construction IAQ Management Plan measure documented.

F. A copy of the Project's "Testing, Adjusting and Balancing" (TAB) report, if applicable.

1.9 QUALITY ASSURANCE:

A. The Contractor will be responsible for preparing and implementing the Construction IAQ Management Plan and must coordinate and incorporate the work of its Subcontractors in the IAQ Management Plan. Include the Construction IAQ Management Plan requirements in contract agreements with Subcontractors. Familiarize Subcontractors with the Construction IAQ Management Plan and how the Construction IAQ Management Plan will affect their daily activities. Hold a Subcontractors' orientation meeting to review the Construction IAQ Management Plan requirements.

B. Responsibility of Subcontractors: Subcontractors for this Project will be responsible for cooperating with the Contractor in the preparation and implementation of the Construction IAQ Management Plan.

C. Include construction IAQ progress check-ins as a regular item in weekly Subcontractor meetings and safety meetings. Provide a copy of the plan on site, posted in an easily accessible area.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION (Not Used)

END OF SECTION 01 81 19

SECTION 01 81 21

SUSTAINABLE CONSTRUCTION REQUIREMENTS

PART I - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

1.2 SUMMARY

A. Section includes general requirements for sustainable construction.

1.3 DEFINITIONS

A. Embodied carbon: The greenhouse gas emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials.

B. Environmental Product Declaration (EPD): A third-party-verified International Organization for Standardization (ISO) Series 14025 Type III declaration that quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

1.4 SUBMITTALS

A. EPDs: The Contractor must submit to the Commissioner copies of all EPD's submitted to the Building Transparency database per Subsection 1.5.C.

B. Low emission vehicles and equipment: The Contractor must submit to the Commissioner a log of all internal combustion engine (ICE) powered equipment used on the Project. The log must be submitted at Substantial Completion, and include:

a. The type of equipment (generator, excavator, crane, light tower, air compressor, etc.),
b. The fuel used by the ICE,
c. The engine size in horsepower (HP), and
d. If the equipment was provided by a Subcontractor, which one.

1.5 ENVIRONMENTAL PRODUCT DECLARATIONS

A. EPDs are required for the following materials, if used:

1. Steel materials:

a. 05 12 00 STRUCTURAL STEEL FRAMING

b. 05 12 13 ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

c. 05 21 00 STEEL JOIST FRAMING

d. 05 31 00 STEEL DECKING

e. 05 40 00 COLD-FORMED METAL FRAMING

f. 05 44 00 COLD FORMED METAL TRUSSES

2. Concrete materials:

a. 03 30 00 CAST-IN-PLACE CONCRETE

b. 03 38 16 UNBONDED POST-TENSIONED CONCRETE

c. 03 41 00 PRECAST STRUCTURAL CONCRETE

d. 03 45 00 PRECAST ARCHITECTURAL CONCRETE

e. 03 47 13 TILT-UP CONCRETE

B. If EPDs are available for materials not listed in subsection 1.5.A, they must be submitted.

C. EPDs must be submitted to the Building Transparency database, using the OpenEPD format, at https://buildingtransparency.org/ec3

1.6 LOW-EMISSION VEHICLES AND EQUIPMENT

A. The Contractor must endeavor to minimize the greenhouse gas emissions from the Contractor's equipment. To achieve this goal, the following is required:

1. Electric powered equipment is to be used where practical instead of internal combustion engine (ICE) powered equipment. The Contractor may refer to the NYC Department of Citywide Administrative Services (NYC DCAS) bi-annual publication, the Clean Fleet Transition Plan (https://www1.nyc.gov/site/dcas/agencies/fleet-sustainability.page), in order to determine what equipment is available.

2. Where ICE powered equipment is necessary, efforts should be taken to ensure the most efficient ICE engines are used. This may include:

a. The use of larger efficient ICE generators to power multiple pieces of electric equipment,
b. Reductions in the use of less than 50HP engines,
c. Use of lower emission or renewable fuels, such as biodiesel or CNG,
d. Use of hybrid electric equipment, and
e. Other innovative methods proposed by the Contractor.

3. The Contractor is required to coordinate between all Subcontractors and trades in order to reduce the number of ICE equipment and generators in use.

PART II - PRODUCTS (Not Used)

PART III - EXECUTION (Not Used)

END OF SECTION 01 81 21

SECTION 01 91 13
GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 91 13

PART I – GENERAL

1.1 RELATED DOCUMENTS:

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

B. The OPR and BOD documents are included by reference for information only.

C. The Commissioning Plan, prepared by the Commissioning Agent (CxA) under separate contract with the City of New York, contains requirements that apply to this section.

1.2 SUMMARY:

A. This section includes general requirements that apply to implementation of Commissioning without regard to systems, subsystems and equipment being commissioned. General Requirements for building enclosure commissioning are addressed in a separate specification.

B. This Section includes:

1. Definitions
2. Commissioning Team
3. City's Responsibilities
4. Contractor's Responsibilities
5. CxA Responsibilities
6. Commissioning Documentation
7. Submittals
8. Coordination
9. Test Equipment
10. Commissioning Process
11. Commissioning Plan and Schedule
12. General Testing Requirements
13. Testing Procedures
14. Deficiencies
15. Operation & Maintenance Manuals
16. Demonstration and Instruction
17. Guaranty Review / Seasonal Testing
18. Record Drawings

1.3 RELATED SECTIONS:

A. System-Specific Commissioning requirements indicated in other sections of the Project Specifications for specific requirements for commissioning systems.

B. This Project will be commissioned by an independent third party under separate contract with the City of New York. Commissioning must be in accordance with ASHRAE and USGBC LEED procedures, and specific commissioning requirements of the Project Specifications, whichever is more stringent. The Contractor must cooperate with the CxA and provide whatever assistance is required.

C. Related sections include, without limitation, the following:
   1. Section 01 10 00 SUMMARY
   2. Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION
   3. Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION
   4. Section 01 78 39 CONTRACT RECORD DOCUMENTS
   5. Section 01 79 00 DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION
   6. Section 01 81 13.04 SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS
   7. Section 01 91 15 GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE

1.4 DEFINITIONS:

A. Refer to Article 2 of the Contract for definition of terms, words and expressions used in the General Conditions not otherwise defined herein.

Basis of Design (BOD)	A document, prepared by the Design Consultant, that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
Checklists	Forms that outline the step-by-step process that must be executed to fulfill the test requirements and to verify that materials, equipment, assemblies and systems are installed in accordance with the Contract Documents. The CxA must develop the checklists; the Contractor must complete them.
Construction Checklist	Form used by Contractor and the CxA to verify that appropriate work components for the Project are on-site, ready for installation, correctly installed, and functional.
Commissioning	Commissioning is a systematic process of ensuring and documenting that the building systems have been installed in the prescribed manner, are functionally checked and capable of being operated and maintained to perform with the design intent and have documentation to support proper installation and operation. The process does not eliminate or reduce the responsibility of the installing Subcontractors to provide a finished product.
Commissioning Agent (Aka Commissioning Authority) (CxA)	Consultant under separate contract with the City of New York to provide Commissioning services for this Project. The CxA must not be an employee of the Contractor, nor will the CxA have any interest in the Contract.
Commissioning Plan	A document developed by the CxA that outlines the organization, schedule, roles and responsibilities, allocation of resources, and documentation requirements of the commissioning process.
Deferred Performance Tests	Performance tests that are performed, at the discretion of the CxA, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design, or other site conditions that disallow the test from being performed.
Design Consultant	The entity responsible for providing design services for the Project, including without limitation, preparing the construction documents (drawings and Specifications) and providing services in connection with such documents during construction. The entity serving as the "Design Consultant" may be a corporation, firm, partnership, joint venture, individual or combination thereof. Such entity may be either an employee(s) of the City or an entity engaged by the City to provide such services.
Factory Testing	Testing of equipment on-site or at the factory, by factory personnel, with or without the City's representative.

Functional Performance Test (FPT)	Functional performance testing includes the dynamic functions and operations of equipment and systems using manual or monitoring methods under various levels of operation. Systems are tested under various modes, such as during low cooling loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarms, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to respond as the sequences state. Such tests must be performed as per the protocol written by the CxA which defines the methods, personnel and expectations.
Issue (or Deficiency)	A condition in the installation or function of a component, piece of equipment, or system that is not in compliance with the Contract Documents.
Issues Log	A formal and ongoing record of problems, deficiencies or concerns that have been raised by members of the Commissioning Team during the course of commissioning. The Issues Log is the primary tracking tool to address all Commissioning Issues by concerned parties. All Issues must be addressed and resolved by the concerned parties before the closeout of the Project. This log tracks the resolution performed and date of closure of each Issue.
Master Equipment List (MEL)	A complete listing of all commissioned building equipment, including details such as make, model, location, ID Tag number, etc. that is taken from submittals and is the basis from which checklists will be generated. The MEL is a spreadsheet which is also used as a tracking tool for all milestones of the commissioning process, such as the creation and performance of checklists, startup of equipment, TAB work, etc.
Monitoring	The recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or the trending capabilities of control systems.
Owner (City of New York) Contracted Tests	Tests paid for by the City of New York outside of the Contractor's Contract and for which the CxA does not provide oversight. These tests will not be repeated during functional testing if properly documented.
Owner's Project Requirements (OPR)	A document, prepared by the Design Consultant that details the functional requirements of a Project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
Pre-functional (Installation) Checklists	A list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the CxA to the Contractor. Installation checklists are primarily static inspections and procedures to prepare equipment or systems for initial operation. Pre-functional (Installation) checklists augment, and are combined with, the manufacturer's startup checklist. The Checklists are filled out by the Contractor and reviewed by the CxA.
Sampling	Functional testing for a percentage of the total number of identical or near-identical pieces of equipment.
Seasonal Performance Tests	Functional tests that are deferred until, or performed again when, the system(s) will experience climate conditions close to their design conditions.
Startup	The initial starting or activating of equipment, including executing construction checklists.
Systems, Subsystems, Equipment, and Components	Where these terms are used together or separately, they mean "as-built" systems, subsystems, equipment, and components.

Systems Manual	A system-focused composite document that includes the Operation and Maintenance Manual, and additional information of use to the owner during the occupancy and operations phase.
Testing, Adjusting and Balancing (TAB)	Testing, adjusting, and balancing of the Heating Hot Water (HHW), Chilled Water (CHW) and Heating, Cooling, and Ventilation Airflow distribution system flows and pressures as specified in Contract Documents by a Subcontractor certified to perform such work.
Test Requirements	Requirements specifying what modes and functions, etc. must be tested on any given piece of equipment or any given system (integrated or standalone). The test requirements are not the detailed test procedures. The test requirements for each system are specified in the respective Contract Documents.
Trending	Monitoring using the building controls system, and analysis of the data gathered over a period of time.

1.5 COMMISSIONING TEAM:

A. Members Appointed by the Contractor and its Subcontractors: Individuals, each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the Commissioning process through coordinated actions. The Commissioning Team will consist of, but not be limited to, representatives of the Contractor, including Project superintendent and Subcontractors, installers, suppliers and specialists deemed appropriate by the CxA.

B. Members Appointed by the City:

1. Commissioning Authority/Agent (CxA): The designated person, company, or entity under separate Contract with the City that plans, schedules and coordinates the Commissioning Team to implement the commissioning process.

2. Representatives of the facility user and operation and maintenance personnel.

3. Design Consultant and other concerned entities.

1.6 CITY'S RESPONSIBILITIES:

A. Provide the OPR and BOD documentation to the CxA for use in developing the Commissioning Plan; systems manual; operation and maintenance orientation plan; and testing plans and checklists.

B. Assign operation and maintenance personnel to participate in Commissioning Team activities.

C. Provide full details and results of any Owner- contracted tests relevant to the current Project.

1.7 CONTRACTOR'S RESPONSIBILITIES:

A. The Contractor must provide utility services required for the commissioning process.

B. As a member of the Commissioning Team, the Contractor and Subcontractors must assign representatives with expertise and authority to act on behalf of the Contractor and its Subcontractor and schedule them to participate in and perform Commissioning Team activities including, but not limited to, the following:

1. Participate in scheduled construction-phase coordination and Commissioning Team meetings.

2. Integrate and coordinate commissioning process activities with the construction schedule.

3. Provide all factory acceptance test reports to the CxA through the Commissioner.

4. Respond to any additional specific information requests from the CxA. CxA may request additional documentation necessary for the commissioning process. Requests by CxA may precede, be concurrent with, or follow normal submittals.

5. Ensure the cooperation and participation of all Subcontractors and manufacturers of equipment to be commissioned.
6. Verify and confirm that components, equipment, and system are functioning as per design prior to CxA witnessing testing.
7. Perform testing required in the Commissioning schedule as per the Commissioning process test procedures provided by the CxA, providing no less than 48 hours' notice to the CxA through the Commissioner.
8. Coordinate schedule with, and perform Cx activities at the direction of, CxA.
9. Provide technicians, instrumentation, tools, and equipment to perform and document the following:
   a. Cx Construction Checklist verification tests.
   b. Cx Construction Checklist verification test demonstrations.
10. Complete installation checklists as Work is completed and return to CxA through the Commissioner.
11. Provide written responses to the CxA through the Commissioner for resolution of Issues recorded in the Issues Log within five (5) business days.
12. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
13. Submit operation and maintenance manuals for systems and subsystems, and equipment in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS. Such documents must be submitted prior to functional testing.
14. Submit As-Built documents in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.
15. Provide orientation sessions for operations and maintenance personnel (sessions will be witnessed by the CxA) in accordance with Section 01 79 00 DEMONSTRATION AND OWNER'S PRE-ACCEPTANCE ORIENTATION. Provide no less than 48 hours' notice to the CxA, through the Commissioner. Video record and edit orientation sessions and provide an electronic recording to the CxA and Commissioner no later than two (2) weeks after the orientation session occurs. Edit as requested by the Commissioner.
16. Provide information requested by the CxA for final commissioning documentation.
17. Provide measuring instruments and logging devices to record test data and provide data acquisition equipment to record data for the complete range of testing for the required test period.
18. Provide detailed startup procedures.
19. Provide a written list of all user adjustable set-points and reset schedules with a brief discussion of the purpose of each and the range of reasonable adjustments with energy implications.
20. Provide a written schedule frequency to review the various set-points and reset schedules to ensure they are current relevant and efficient values.
21. Respond to provided new deficiencies and/or responses within five (5) business days.
22. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the Contract Documents. Submit to CxA 45 days after submittal acceptance.
23. Coordinate with the CxA to provide 48-hour advance notice so that the witnessing of equipment and system start-up and testing can begin.

24. Notify the CxA a minimum of two weeks in advance of the time for start of the testing and balancing work. Attend the initial testing and balancing meeting for review of the official testing and balancing procedures.

25. Provide written notification to the Commissioner and CxA that the following work has been completed in accordance with the Contract Documents, and that the equipment, systems, and sub-system are operating as required.

26. The equipment suppliers will document the performance of their equipment.

27. Provide a complete set of record drawings to the CxA prior to the start of Functional Performance Testing.

28. Contractor responsibilities to be completed by Equipment Suppliers:

    a. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the City of New York's personnel, to keep warranties in force.

    b. Assist in equipment testing.

    c. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.

1.8 COMMISSIONING AGENT'S (CxA) RESPONSIBILITIES:

A. Organize and lead the Commissioning Team.

B. Prepare a construction-phase Commissioning Plan. Collaborate through the Commissioner with Contractor and with Subcontractors to develop test and inspection procedures. Include design changes and coordinate Commissioning activities with the overall Project schedule. Identify Commissioning Team member responsibilities, by name, firm, and trade specialty, for performance of each commissioning task. Update the Commissioning Plan during construction as required.

C. Review and comment in accordance with Section 01 33 00 SUBMITTAL PROCEDURES, on submittals from the Contractor for compliance with the OPR, BOD, Contract Documents, and construction-phase Commissioning Plan. Review and comment on performance expectations of systems and equipment and interface between systems relating to the OPR and BOD.

D. Coordinate with the Commissioner, in accordance with Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION, to convene Commissioning Team meetings for the purpose of coordination, communication and conflict resolution; discuss progress of the commissioning processes.

E. At the beginning of the construction phase, coordinate with the Commissioner's kick-off meeting schedule to conduct an initial construction-phase coordination meeting for the purpose of reviewing the Commissioning activities and establishing tentative schedules for operation and maintenance submittals, operation and maintenance orientation sessions, TAB Work, testing, and Project completion.

F. Perform site visits to observe and inspect construction as described in the Commissioning Plan. Report progress and deficiencies to the Commissioner. In addition to compliance with the OPR, BOD, and Contract Documents, inspect systems and equipment installation for adequate accessibility required for component maintenance replacement and repair.

G. Prepare and distribute project-specific test and inspection procedures and checklists and maintain MEL.

H. Verify air and water systems balancing by sampling, reviewing completed reports and selected site observation. Coordinate submittal reviews with the Commissioner so that the comments are combined into a single review and submitted to the Contractor.

I. Coordinate with the Commissioner to witness and document tests, inspections and systems startup, as per the Commissioning Plan.

J. Maintain an Issues Log and a record of functional testing. Report all Issues as they occur to the Commissioner.

K. Compile test data, inspection reports and certificates, and include them in the systems manual and Commissioning Report.

L. Certify date of acceptance and startup for each item of equipment for start of warranty periods.

M. Review and comment on operation and maintenance documentation and systems manual outline for compliance with the OPR, BOD, and Contract Documents. Operation and maintenance documentation requirements are specified in other sections of the Project Specifications and described in Section 01 78 39 CONTRACT RECORD DOCUMENTS.

N. Review agenda for orientation; witness and confirm orientation session conforms with agenda and Contract Documents; review recording of demonstration and orientation sessions provided by the Contractor on USB drive or other electronic media as requested by the Commissioner and provide appropriate comments for editing.

O. Return to the site ten (10) months into the twelve (12)-month guaranty period, to review with facility staff the current building operation and the condition of outstanding Issues related to the original and seasonal commissioning. Interview facility staff and identify problems or concerns they have with operating the building as originally intended.

P. Prepare Commissioning Reports.

Q. Assemble the final commissioning documentation, including the Commissioning Report and Systems Manual.

R. Perform all CxA tasks as defined by LEED and the NYC Energy Conservation Code; prepare LEED submittal documents and preliminary and final Commissioning Reports as required by the NYC Energy Conservation Code.

1.9 COMMISSIONING DOCUMENTATION:

The Contractor must assist the CxA in the development and compiling of the following Commissioning Documentation:

A. Index of Commissioning Documents: The CxA will prepare an index including the storage location of each document.

B. Commissioning Plan: A document prepared by the CxA that outlines the schedule, allocation of resources, roles and responsibilities, and documentation requirements of the Commissioning process. Within 30 days of receipt of the Commissioning Plan, the Contractor must review the plan and document any issues or concerns with RFIs in compliance with Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION.

C. Test Checklists: The CxA will develop test checklists for each system, subsystem, or equipment including interfaces and interlocks, and include a separate entry, with space for comments, for each item to be tested. The CxA will prepare separate checklists for each mode of operation and provide space to indicate whether the mode under test responded as required. Space will be provided for testing personnel to sign off on each checklist. Specific checklist content requirements are specified in other sections of the Project Specifications, but must include without limitation:

1. Identification of tested item
2. Date of test
3. Indication of whether the record is for a first test or retest following correction of a problem or Issue
4. Dated signatures of the person performing the test and of the witness if applicable

5. Deficiencies and Issues, if any, generated as a result of the test

D. Inspection Checklists will be signed by the Contractor, Subcontractor(s), Installer(s), and CxA certifying that systems, subsystems, equipment, and associated controls are ready for testing.

E. Test and Inspection Reports: The CxA will record test data, observations, and measurements on test checklists. Photographs, forms, and other means appropriate for the application will be included with data. CxA must compile test and inspection reports and test and inspection certificates and include them in systems manual and Commissioning Report.

F. Corrective Action Documents: The CxA will document corrective action taken for systems and equipment that fail tests and include required modifications to systems and equipment and revisions to test procedures, if any. The Contractor must retest systems and equipment requiring corrective action. The CxA will document retest results.

G. Issues Log: The CxA will prepare and maintain an Issues Log that describes design, installation, and performance Issues that are at variance with the OPR, BOD, and Contract Documents. The log will identify and track Issues as they are encountered, documenting the status of unresolved and resolved Issues. The Issues Log will identify, at a minimum:

1. The party responsible for correcting the Issue,
2. The person documenting the Issue resolution,
3. The exact location of the Issue (floor and room),
4. The applicable system component,
5. A detailed description of the Issue,
6. The Issue status, and
7. The date the Issue was discovered and the date the Issue was resolved.

H. Commissioning Report: The CxA will document results of the commissioning process including unresolved Issues and performance of systems, subsystems, and equipment. The Commissioning Report will indicate whether systems, subsystems, and equipment have been completed and are performing according to the OPR, BOD, and Contract Documents. The Commissioning Report must include:

1. An executive summary, including participants and their roles, a brief building description, an overview of the commissioning and testing scope, and a general description of testing and verification methods,
2. Installation/Pre-Functional Checklists,
3. Start-up reports,
4. Functional Test documentation,
5. Trend Log Analysis,
6. The final Issues Log, with all Issues identified through the commissioning process, identifying which, if any, Issues remain unresolved,
7. The Commissioning Plan,
8. Commissioning progress and field reports,
9. Commissioning review documents, and
10. Record of owner’s orientation.

I. Systems Manual: The CxA will gather required information and compile systems manual as specified in other sections of the Project Specifications and described in Section 01 78 39 CONTRACT RECORD DOCUMENTS.

1.10 SUBMITTALS:

A. Submittal of shop drawings, product data, samples, etc., relevant to commissioning must be provided to the CxA as requested. Such submittals must be in compliance with Section 01 33 00 SUBMITTAL PROCEDURES.

B. As-Built Contract Record Drawings and Operating and Maintenance Manuals relevant to commissioning must be provided to the CxA as requested. Such submittals must be in compliance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.

C. All demonstration and orientation submittals relevant to commissioning must be provided to the CxA as requested. Such submittals must be in compliance with Section 01 79 00 DEMONSTRATION AND OWNER'S PREACCEPTANCE ORIENTATION.

D. Completed Prefunctional (Installation) Checklists must be provided to the CxA prior to equipment startup.

1.11 COORDINATION:

A. Coordination of Commissioning is the responsibility of all Commissioning Team members.

B. Coordinating Meetings: The CxA will coordinate with the Commissioner's regularly scheduled construction progress meetings to conduct coordination meetings of the Commissioning Team to review progress on the Commissioning Plan, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities. Commissioner and Contractor must ensure that all required Commissioning Team members attend.

C. Commissioning Kick-Off Meeting – Construction Team: The Contractor will attend a meeting of the Commissioning Team, chaired by the CxA, to review the scope of commissioning process activities and the Commissioning Plan with discussions on milestones, activities, and assignments of responsibilities. The flow and type of documents and the amount of submittal data given to the CxA will be determined. Meeting minutes will then be distributed to all parties by the CxA.

D. Commissioning Meetings: The Contractor will attend coordination meetings with the Commissioning Team, chaired by the CxA, to review progress on the Commissioning Plan, construction deficiencies, scheduling conflicts, and to discuss strategies and processes for upcoming commissioning process activities.

E. Miscellaneous Construction Meetings: The CxA attends selected planning and job-site meetings in order to remain informed on construction progress and to update parties involved in the commissioning process. This will not include 100% meeting attendance, but the CxA will be provided with the subsequent meeting minutes for review.

F. Construction Documents: The Contractor, through the Commissioner, will furnish copies of all construction documents, addenda, change orders and appropriate submittals and shop drawings to the CxA.

G. Pre-testing Meetings: The CxA will coordinate with the Commissioner to conduct pretest meetings of the Commissioning Team to review startup reports, pretest inspection results, testing procedures, testing personnel and instrumentation requirements, and manufacturers' authorized service representative services for each system, subsystem, equipment, and component to be tested. The Commissioner, Contractor, and all required Commissioning Team members will attend pretest meetings.

H. Testing Coordination: The Contractor will coordinate with testing personnel and agencies for timing and access for CxA to witness test. The CxA will advise the Commissioning Team as to the sequence of testing activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

I. Manufacturers' Field Services: The Contractor must coordinate manufacturers' field services, as per the Commissioning Plan.

J. The CxA will regularly apprise the Commissioner of progress, pending problems and/or disputes, as well as provide regular status reports on progress with each system.

PART II – PRODUCTS

2.1 TEST EQUIPMENT:

A. All industry standard test equipment required for performing the specific tests must be provided by the Contractor responsible for testing. Any proprietary Vendor-specific test equipment must be provided by that Vendor or Manufacturer.

B. Special equipment, tools, instruments, software, and equipment communication network access hardware and software (only available from Vendor, specific to the piece of equipment) required for testing equipment according to the Contract Documents must be included at no extra cost to the City and must be turned over to the City at Project close-out, except for stand-alone data logging equipment that may be used by the CxA.

C. Any portable or handheld setup and/or calibration devices required to initialize the control system must be made available by the control vendor for use by the CxA at no additional cost to the City.

D. The instrumentation used in the commissioning process must comply with the following:

1. Be of sufficient quality and accuracy to test and/or measure system performance within the tolerances required

2. Be calibrated at the manufacturer’s recommended intervals with calibration tags permanently affixed to the instrument

3. Be maintained in good repair and operating condition throughout use duration on this Project

4. Be immediately recalibrated or repaired if dropped and/or damaged in any way during this Project.

PART III – EXECUTION

3.1 COMMISSIONING PROCESS:

A. The following provides an overview of the Commissioning tasks during Project construction and the general order in which they occur.

1. Construction-phase Commissioning begins with a Commissioning Kickoff Meeting, conducted by the CxA through the Commissioner in accordance with section 01 31 00 PROJECT MANAGEMENT AND COORDINATION, where the Commissioning process is reviewed with all the Commissioning Team Members.

2. Additional meetings may be required throughout construction, scheduled by the CxA through the Commissioner in accordance with 01 31 00 PROJECT MANAGEMENT AND COORDINATION with necessary parties attending, to plan, scope, coordinate and schedule future activities and resolve open Issues.

3. The CxA will review the Contractor submittals concurrent with the Commissioner and provide comments to the Commissioner for inclusion in their review. The reviewed submittals will include all commissioned equipment information, including detailed startup procedures, and coordination drawings that include commissioned equipment and systems, control drawings and sequences, and interfaces and interlocks between systems.

4. The CxA works with the Commissioner and Contractor in developing Pre-functional and Functional Test documentation formats.

5. Periodically throughout the construction process, the CxA will perform site visits to observe component and system installations.

6. The checkout and performance verification generally proceeds from component level to equipment to systems and intersystem levels. Pre-functional (Installation) Checklists are to be completed before equipment startup. Equipment startup must be completed before TAB. TAB must be completed before the Functional Performance Checklists.

7. The Contractor must, with guidance from the CxA, execute and document the Pre-Functional (Installation) Checklists and perform startup and initial checkout of equipment and systems. The CxA documents that the checklists and startup are completed according to the approved plans. This will include the CxA witnessing selected assembly markups, portions of the startup of selected equipment, and spot checking the Pre-Functional (Installation) Checklists.

8. The CxA develops specific equipment and system Functional Checklists. The Contractor receives a copy of the procedure through the Commissioner. The CxA may request additional design narrative from the Commissioner and Controls Subcontractor, depending on the completeness of the Basis of Design and sequences provided within the design documents.

9. The Functional Checklists are executed by the Contractor and witnessed and documented by the CxA.

10. Items of non-compliance in material, installation startup, and operation are corrected and the equipment or system is rechecked. The CxA will maintain an Issues Log to track Issues and Issue resolution.

11. The CxA will review the operation & maintenance documentation for completeness.

12. Commissioning, excluding the Warranty Walkthrough and any seasonal testing at the written direction of the Commissioner, must be completed prior to Substantial Completion.

13. The CxA reviews the orientation documentation. The orientation schedules and agenda are provided by the Subcontractors. The CxA verifies that orientation is completed, attended by the appropriate City of New York personnel, is thorough and provides all necessary information required to operate and service the equipment or system.

14. Deferred testing/checkouts are conducted, as specified or required in the Contract Documents.

3.2 COMMISSIONING PLAN AND SCHEDULE:

A. Commissioning Plan: The Commissioning Plan provides guidance in the execution of the commissioning process. After the initial construction phase Commissioning kickoff meeting, the CxA will update the plan. This plan is a living document that must evolve and expand as the Project progresses. The Commissioning Plan must include:

1. Description of the facility and Project.

2. Description of the commissioning process and associated deliverable documents.

3. Description of equipment and systems to be commissioned.

4. Description of schedules for testing procedures along with identification of parties involved in performing and verifying tests.

5. Sample rates for equipment to be tested.

6. Identification of task items that must be completed before the next operation can proceed.
7. Description of responsibilities of Commissioning Team members.
8. Description of observations to be made and reported on during testing and witnessing of testing by all parties involved in the Project.

B. Commissioning Schedule: Contractor must provide construction schedules to the CxA, in accordance with Section 01 31 00 PROJECT MANAGEMENT AND COORDINATION. The CxA will develop and submit a schedule identifying the commissioning process and provide commissioning scheduling information to the Commissioner and Contractor for review and planning activities. The Contractor must incorporate the CxA's activities into the Project schedule.

3.3 GENERAL TESTING REQUIREMENTS:

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Tests will be performed using design conditions whenever possible.

C. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

D. The CxA may direct that set points be altered when simulating conditions are not practical.

E. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

F. If tests cannot be completed because of a deficiency outside the scope of the HVAC system, document the deficiency and report it to the Commissioner. After deficiencies are resolved, reschedule tests.

G. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

H. Refer to individual Commissioning specification sections for additional testing requirements.

3.4 TESTING PROCEDURES:

A. The CxA will determine and document the acceptance procedures for each system within disciplines. The acceptance procedures must incorporate the commissioning standards and successful testing results as referred to throughout the Specifications.

B. The CxA will provide performance checklists and performance checkout data sheets for each system based on actual system configuration. Special emphasis must be placed on checkout procedures that must conclusively determine actual system performance and compliance with the OPR and BoD.

C. The Contractor and appropriate Vendor(s) must be informed of what tests are to be performed and the expected results. The Commissioning Plan must address the test requirements and be distributed to all parties involved with that system.

D. Prior to Functional Testing, the Contractor must provide the following:

1. Contractor must certify in writing that commissioned systems, subsystems, and equipment have been installed, calibrated and started, and are operating according to the Contract Documents and approved submittals.

2. Contractor must certify in writing that all relevant instrumentation and control systems have been completed and calibrated,

3. Contractor must certify point-to-point checkout has been successfully completed, and that systems are operating in accordance with their design sequence of operation, Contract Documents, and approved submittals.

4. Contractor must certify that all sensors are operating within specified accuracy and all systems are set to and maintaining set points as required by the Contract Documents.

5. Contractor must certify in writing that TAB procedures have been completed, and that the TAB report has been submitted, discrepancies corrected, and corrective work approved.

6. Contractor must perform tests for system and intersystem performance only after CxA and Commissioner have approved the completed testing checklists for systems, subsystems, and equipment.

7. Contractor must inspect and verify the position of each device and interlock identified on checklists.

8. Contractor must check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.

9. Set systems, subsystems, and equipment into operating mode to be tested in accordance with approved test procedures (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

10. Contractor must install measuring instruments and logging devices to record test data as directed by the CxA.

E. The Functional Performance tests must be performed by the Contractor and Vendor(s) with oversight by the CxA. The CxA must witness, verify, and document these tests.

1. Functional Performance Tests must include operating the systems and components through each of the written sequences of operation, other significant modes of miscellaneous alarms, power failure, and security alarm when impacted by and interlocked with commissioned equipment, as detailed in the Commissioning Plan.

2. Checklists must be completed comprehensively and to the extent necessary to enable the CxA to assure the Commissioner that the systems perform as per the OPR, BOD, and Contract Documents.

3. If a test is failed for any reason and retesting is required, the Contractor must provide retesting at no additional cost to the City.

4. If a test must be witnessed more than twice by the Commissioning Agent due to repeated failure to perform as per the design documents, the Contractor must be responsible for the Commissioning Agent’s fee for witnessing repeated tests beyond the second incidence. Such fee will be negotiated between the Commissioning Agent and the Commissioner.

5. After testing, Contractor must return settings to normal operating conditions.

3.5 DEFICIENCIES:

A. Deficiencies/Non-Conformance.

1. The CxA will record the results of the functional test on the test form. All deficiencies or non-conformance items must be noted and reported to the Commissioner and the Contractor on a standardized form.

2. The Contractor must respond to new deficiencies within five (5) business days. The response must either indicate the issue will be corrected with anticipated date of completion indicated or the response should clearly indicate why the Contractor disputes the claim while referencing the Contract Documents in dispute or requesting further information to clarify the concern.

3. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA.

4. Every effort must be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures.

5. As tests progress and a deficiency is identified, the CxA discusses the issue with the Contractor.

6. When there is no dispute on the deficiency and the Contractor accepts responsibility to correct it, the CxA documents the deficiency and the Contractor's response and intentions or corrections. The CxA and Contractor then proceed to another test or sequence. Once the Contractor corrects the deficiency, the test is rescheduled and repeated in the anticipation of correct operation or function.

7. When there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible, the CxA documents the deficiency and the Contractor's response. The deficiency is then forwarded to parties assumed to be responsible for the deficiency. Resolutions are made at the lowest management level possible. Other parties are brought into the discussion as needed. Final interpretive authority is with the Commissioner. Final acceptance authority is with the Commissioner and CxA. The CxA will then document the resolution process. Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency. The CxA then reschedules the test as stated in the section above.

8. Deficiencies that are not corrected at the time of documentation, must be completed by the affected subcontractor and photo evidence of the deficiency resolution must be sent by the Contractor to both the Commissioner and the CxA.

B. Failure due to Manufacturer Defect.

1. The CxA and Commissioner will determine the equipment to be tested. If 10% of the equipment being tested, or three identical pieces of the equipment tested (irrespective of equipment unit size), whichever is greater, fail to perform due to manufacturing defect (mechanically or substantively), not allowing it to meet its submitted performance requirements, all identical pieces of equipment may be considered unacceptable by the CxA and the Commissioner. In such case, the Contractor must provide the Commissioner with the following:

   a. Within one week of notification from the Contractor, the manufacturer's representative will examine all other identical units making a record of the findings. The findings must be provided to the Commissioner within two weeks of the original notice.

b. Within two weeks of the original notification, the Contractor or manufacturer will provide a signed and dated written explanation of the problem, cause of failures, etc., and all proposed solutions which shall include full equipment submittals. The proposed solutions must not significantly exceed the specification requirements of the original installation.

c. Commissioner will determine whether a replacement of all identical units or a repair is acceptable.

d. Two examples of the proposed solution will be installed by the Contractor and the Contractor will be allowed to test the installations for up to one week, upon which the Commissioner will decide whether to accept the solution.

e. Upon acceptance, the Contractor and/or manufacturer must replace or repair all identical items, at their expense, and extend the manufacturer's warranty accordingly, if the original equipment warranty had begun. The replacement/repair work must proceed with reasonable speed beginning within one week from when parts can be obtained.

3.6 OPERATION & MAINTENANCE MANUALS:

A. General

1. The CxA must review the operation & maintenance manuals provided by the Contractor for completeness of the document. The review process will verify that operation & maintenance instructions meet Specifications and are included for all commissioned equipment furnished by the Contractor.

2. The CxA will communicate deficiencies in the manuals to the Contractor, or Commissioner, as requested. Upon a successful review of the corrections, the CxA recommends approval and acceptance of these sections of the operation & maintenance manuals to the Commissioner. The CxA also reviews each equipment warranty and verifies that all requirements to keep the warranty valid are clearly stated.

3. Published literature will be specifically oriented to the provided equipment, indicating required operation and maintenance procedures, parts lists, assembly / disassembly diagrams and related information.

4. The Contractor must incorporate the standard technical literature into system-specific formats for this facility as designed and as actually installed. The resulting operation & maintenance information must be system-specific, concise, to the point and tailored specifically to this facility. The CxA must review these documents as necessary for final corrections by the Contractor.

5. Contractor must submit operations & maintenance manuals for each piece of equipment for review no later than 45 days after submittal approval.

B. The operation & maintenance manual review and coordination efforts must be completed prior to Owner orientation sessions, as these documents are to be utilized in the orientation sessions.

C. System Operations Manual

1. The CxA must prepare and deliver these documents with inputs from the Contractor. The Contractor must provide all required documents to the CxA, through the Commissioner. The required documents must be described in the Commissioning Plan and Contract Documents. Typically, the manual includes the following:

a. System, subsystem, and equipment descriptions.

b. Commissioned systems single line diagrams (to be provided by Mechanical, Electrical, Plumbing, and Building Management System (BMS) Subcontractors).

c. As built sequences of operations, control drawings and original set points (to be provided by Design Consultant and BMS Subcontractor).

d. Operating instructions for integrated building systems (to be provided by Mechanical and BMS Subcontractors).

e. Recommended schedule of maintenance requirements and frequency (to be provided by Subcontractors).

f. Recommended schedule for calibrating sensors and actuators (to be provided by BMS Subcontractor).

3.7 DEMONSTRATION AND INSTRUCTION:

A. The Contractor must schedule and coordinate instruction sessions for the facility's staff for each commissioned system. Demonstrations must be held per Contract Documents, along with the appropriate schematics, handouts and visual / audio orientation aids onsite with equipment.

B. The equipment vendors must provide instruction on the specifics of each major equipment item including philosophy, troubleshooting and repair techniques.

C. The Contractor must record and edit demonstration and orientation sessions, and provide these records to the CxA, through the Commissioner.

D. For additional direction pertinent to instruction, refer to other specific specification sections for demonstration and instruction requirements.

E. The Contractor will be responsible for instruction coordination, scheduling, and completion of demonstrations and instructions.

F. The CxA will oversee the instruction of the City of New York's personnel for commissioned equipment and systems.

1. The CxA will interview the City of New York's personnel to determine the special needs and areas where instruction will be most valuable. The Commissioner and CxA will decide how rigorous the instruction should be for each piece of commissioned equipment. The CxA will communicate the results to the Contractor who will ensure participation by the Subcontractors.

2. In addition to these general requirements, the specific instruction requirements of the City of New York's personnel by the Contractor are specified in the DDC's General Conditions Section 017900 "Demonstration and Owners' Pre-Acceptance Orientation."

3. The Contractor must ensure that each Subcontractor and vendor responsible for instruction will submit a written instruction plan to the Contractor for review and approval prior to instruction. The Contractor will submit one comprehensive instruction plan to the CxA and the Commissioner.

4. The plan will be reviewed by the CxA and the Commissioner. Comments pertaining to its deficiencies will be forwarded to the Contractor. The instruction plan will be rewritten until approved by the CxA and the Commissioner. The final approved instruction plan will cover the following elements:

a. Equipment (included in instruction)

b. Intended audience

c. Location of instruction

d. Objectives

e. Subjects covered (description, duration of discussion, special methods, etc.)

f. Duration of instruction on each subject

g. Qualified instructor for each subject

h. Instructor qualifications

i. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)

5. Instruction documentation must include the following items:

a. Copy of the instruction plan, including schedule, syllabus, and agenda.

b. Copy of the Owner's Project Requirements.

c. Compiled operations manuals.

d. Compiled maintenance manuals.

e. Completed manufacturer instruction manuals.

f. Record drawings.

6. The CxA develops criteria for determining that the instruction was satisfactorily completed, including attending the instruction, etc. The CxA recommends approval of the instruction to the Commissioner using a standard form. The Commissioner signs the approval form/letter template.

7. At one of the instruction sessions, the CxA presents a presentation discussing the use of the blank functional test forms for re-commissioning equipment.

8. Video recording of the instruction sessions will be verified by the CxA in electronic format, at the discretion of the Commissioner.

3.8 GUARANTY REVIEW / SEASONAL TESTING

A. Seasonal Testing – During the twelve (12)-month guaranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) must be completed as part of this Contract. The CxA will coordinate this activity. Tests will be executed and documented, and deficiencies will be corrected by the Contractor, with facilities staff and the CxA witnessing. Any final adjustments to the operation & maintenance manuals and record documents due to seasonal testing will be made by the Contractor.

B. The CxA will return upon the start of the new season (cooling or heating) after Project completion to conduct performance tests that could not be performed due to ambient conditions. The seasonal testing will only be performed if suitable loads / conditions were unavailable during the performance testing stages (in other words; the requirement for testing is warranted), and at the written direction of the Commissioner.

C. The CxA will return to the site approximately ten (10) months into the twelve (12)-month guaranty period and interview the occupants and maintenance staff, review the operation of the building, provide recommendations for installation and operational problems and document guaranty and operational issues in the Issues database.

3.9 RECORD DRAWINGS

A. The CxA must review the as built Contract Documents to verify incorporation of both design changes and as-built construction details. Discrepancies noted must be corrected by the appropriate party.

END OF SECTION 01 91 13

SECTION 01 91 15
GENERAL COMMISSIONING REQUIREMENTS FOR BUILDING ENCLOSURE

REFER TO THE ADDENDUM FOR APPLICABILITY OF THIS SECTION 01 91 15

PART I – GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum, and (5) the Contract [City of New York Standard Construction Contract].

B. The Owner's Project Requirements (OPR) and Basis of Design (BOD) documents are included by reference for information only.

C. The Commissioning Plan, prepared by the Commissioning Agent (CxA) under separate contract with the City of New York, contains requirements that apply to this section.

1.2 SECTION INCLUDES

A. This section includes the commissioning requirements for the Building Enclosure systems. Refer to "Exterior Enclosure Commissioning" in other sections of the Project Specifications for specific requirements regarding Building Enclosure Commissioning.

1. The commissioning requirements for the Building Enclosure systems given in this section are entirely separate from, and in addition to, the Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS for this Project. The Contractor, and its Suppliers, Subcontractors, Vendors, etc., are required to participate in both commissioning processes as required.

1.3 DESCRIPTION

A. Building Enclosure Commissioning (BECx) is a systematic process of ensuring all building enclosure systems responsible for environmental separation perform as per the OPR and BOD. The BECx process is intended to verify and document proper installation and performance of building enclosure materials and systems in accordance with the Contract Documents.

B. Commissioning does not take away from, or reduce, the Contractor's responsibility to provide a finished and fully functioning product and installation.

C. This section will in no way diminish the responsibility of the Contractor in performing all aspects of work and testing as outlined in the Contract Documents. Any requirements outlined in this section are in addition to requirements outlined in the Contract Drawings and Specifications.

1.4 RELATED WORK

A. Specific BECx requirements are given in this Section. The following Project Specification sections are related to the commissioning work specified in this section:

1. Basic Concrete Requirements: Refer to Division 03
2. Basic Metal Requirements: Refer to Division 05
3. Basic Waterproofing, Roofing, Air Barrier and Insulation Requirements: Refer to Division 07
4. Basic Fenestrations Requirements: Refer to Division 08
5. Basic Finishing Requirements: Refer to Division 09

1.5 DEFINITIONS AND ABBREVIATIONS

A. Refer to Article 2 of the Contract and Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS for terms, words, and expressions not otherwise defined herein.

Approval	Acceptance that a material or system has been properly installed and is functioning in tested modes according to the Contract Documents.
Building Enclosure Commissioning Agent (BECA)	BECA directs and coordinates day-to-day BECx commissioning activities.
Building Enclosure Testing Agency (BETA)	Building Enclosure Testing Agency whom is an independent agency retained by the Contractor and approved by the Commissioner, fully accredited by the appropriate governing body for each of the materials, components or systems to be tested or evaluated for compliance with requirements of the Contract Documents and as directed by the BECA. Documentation of such certification must be submitted to and approved by the Commissioner prior to the start of any work by the BETA.
Commissioning	Commissioning is a systematic process of ensuring and documenting that the building systems have been installed in the prescribed manner, are functionally checked and capable of being operated and maintained to perform with the design intent, and have documentation to support proper installation and operation. The process does not eliminate or reduce the responsibility of the installing Subcontractors to provide a finished product.
Commissioning Agent (CxA)	Refer to Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS for Definition.
Commissioning Plan	Refer to Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS for Definition.
Deficiency	Condition of a building enclosure material or system that is not in compliance with Contract Documents (that is, does not perform properly or does not comply with design intent).
Design Consultant	Refer to Section 01 91 13 GENERAL COMMISSIONING REQUIREMENTS FOR MEP SYSTEMS for Definition.
Simulated Condition	Condition created for testing component or system (e.g., applying pressure differential across the building enclosure concurrent with water spray to simulate a wind driven rain).
Mock-up	The activities where systems or materials are initially constructed and tested.

1.6 COORDINATION

A. Building Enclosure Commissioning Team: Members of the Building Enclosure Commissioning Team will consist of:

1. CxA
2. BECA
3. BETA
4. Commissioner
5. Contractor, and all Building Enclosure Subcontractors
6. Design Consultant

B. Management: City of New York will contract services of the BECA through a separate contract. The BECA will direct and coordinate commissioning activities and report to the Commissioner. All members of the

Building Enclosure Commissioning Team must cooperate to fulfill contracted responsibilities and objectives of the Contract Documents.

C. Scheduling: BECA must work with the Building Enclosure Commissioning Team to establish required commissioning activities to incorporate into the preliminary commissioning schedule. The Contractor must integrate commissioning activities into master construction schedule, in accordance with Section 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION. Necessary notifications are to be made in a timely manner in order to expedite commissioning.

1.7 SUBMITTALS

A. Contractor must provide documentation required for commissioning work in accordance with Section 01 33 00 SUBMITTAL PROCEDURES. At minimum, documentation must include, but not be limited to:

1. Submittal of shop drawings, product data, samples, etc., relevant to BECx and as requested by the BECA. Such submittals must be in compliance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.
2. As-Built Record Drawings and Operation and Maintenance Information relevant to BECx and as required by the BECA. Such submittals must be in compliance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.
3. All demonstration and orientation submittals relevant to BECx and as requested by the BECA. Such submittals must be in compliance with Section 01 79 00 DEMONSTRATION AND OWNER'S PREACCEPTANCE ORIENTATION.
4. Performance data, any performance test procedures, and installation and checkout materials.

B. The Contractor must provide all submittals to the Design Consultant, as per Section 01 33 00 SUBMITTAL PROCEDURES. The Design Consultant will transmit all building enclosure related submittals to the BECA for concurrent review.

PART II – PRODUCTS (Not Used)

PART III – EXECUTION

3.1 SYSTEMS TO BE COMMISSIONED

A. Building Enclosure systems to be commissioned may include, but are not limited to, Roof waterproofing, including garden roof systems, all penetrations, and transitions; skylights and other sloped glazing; exterior walls, including the air barrier system, water management systems, and thermal insulation; punched windows, window walls, curtain walls, storefronts, glazed entries, doors, and louvers; sealants, expansion joints, and control joints; flashings, including all transitions and end-dams; terrace, balcony, and deck waterproofing; below-grade waterproofing, including drainage, waterproofing and damp proofing; below slab floor barriers; interface and transition conditions between exterior enclosure components and systems; smoke controls and fire separation and stopping; and any other special building enclosure systems, equipment, and controls. Refer to the Contract Documents for clarity.

3.2 RESPONSIBILITIES OF COMMISSIONING TEAM MEMBERS DURING CONSTRUCTION PHASE

A. Responsibilities of the Design Consultant include without limitation the following:

1. Review BECA comments on construction documents and shop drawings.
2. Assist in dispute resolution regarding building enclosure items.
3. Review BECA reports.
4. Incorporate BECA Submittal Review Comments into response on submittals.

B. Responsibilities of the BECA include the following without limitation:

1. Review and comment on Mock-up construction and testing plan as provided by Contractor.
2. Development of BECx Plan.
3. Review of building enclosure shop drawings and submittals, including “approved equal” requests, through the Commissioner in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.
4. Attend combined pre-construction and BECx kick-off meeting.
5. Develop construction checklists for the building enclosure for the Contractor’s use.
6. Observe the construction of a building enclosure Mock-up.
7. Witness the testing of a building enclosure Mock-up.
8. Project meetings / conference calls / coordination.
9. Field monitor installation of exterior enclosure components.
10. Update field report log.
11. Update BECx Plan.
12. Advise on Requests for Information.
13. Assist with the preparation of LEED paperwork.
14. Prepare systems manual, with required inputs and documentation from the Contractor in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.
15. Complete Maintenance Plan, with required inputs and documentation from the Contractor in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.
16. Prepare training manual, with required inputs and documentation from the Contractor in accordance with Section 01 78 39 CONTRACT RECORD DOCUMENTS.
17. Prepare final BECx record and enclosure commissioning close-out documents.
18. Develop on-going BECx Plan.

C. Responsibilities of the Contractor and Building Enclosure Subcontractors include without limitation the following:

1. Review BECx Plan and FPT specification.
2. Attend commissioning kick-off meeting and other Building Enclosure Commissioning Team meetings.
3. Incorporate commissioning activities into the construction schedule.
4. Periodically update Commissioning activities in the construction schedule.
5. Notify Commissioner and BECA of work completion.
6. Verify building enclosure materials and assemblies are ready for functional testing.
7. Retain the services of an approved independent BETA; submit qualifications of independent BETA to Commissioner for approval; coordinate all activities and deliverables of this BETA; ensure all BETA deliverables are provided to the Building Enclosure Commissioning Team.
8. Attend all required material and systems testing.
9. Execute all periodic maintenance or repairs required on started systems from initial Mock-up of equipment to Final Acceptance by Commissioner to prevent material warranties from being voided.
10. Submit maintenance logs of all interim maintenance or repair tasks performed by Contractor.

11. Ensure installation work is complete, is in compliance with Contract Documents, and is ready for Functional Performance Testing. FPT test results will be documented by BECA.
12. Ensure resolution of non-compliance and deficiencies in construction or test results. Obtain written documentation of completion from the appropriate subcontractors.
13. Provide letters of compatibility for adjacent building enclosure materials and assemblies.
14. Facilitate all repairs and retesting of failed condition at no additional cost to the City of New York.
15. Provide all warranty information to BECA.

D. Responsibilities of the BETA include without limitation the following:

1. Attend Commissioning kick-off meeting and other Building Enclosure Commissioning Team meetings.
2. Provide on-site technician and equipment to complete Mock-up and field Functional Performance Testing.
3. Prepare and submit reports to the Commissioner at the conclusion of all testing.
4. Perform retesting and prepare corresponding reports.

3.3 BUILDING ENCLOSURE COMMISSIONING TEAM (BECx) MEETINGS

A. BECx meetings will be held periodically, as determined by the Commissioner and recommended by BECA.

B. Discussions held in BECx meetings must include, but not be limited to: system/materials, mock-up/field, progress, scheduling, testing, documentation, deficiencies, and problem resolution.

C. The Contractor must attend BECx meetings, and must ensure the attendance of required subcontractors, as requested.

3.4 REPORTING

A. BECA will provide status reports to the Commissioner. The Commissioner will provide such status reports to the Contactor, CxA, Design Consultant, and other entities as needed.

B. BECA will submit non-compliance and deficiency reports to Commissioner. The Commissioner will provide such reports to the Contractor, CxA, Design Consultant, and other entities as needed.

C. BECA will provide a final summary report to Commissioner and CxA.

3.5 MOCK-UP AND FINAL CONSTRUCTION

A. Prior to Functional Performance Testing or concealment of functional performance layers within the building enclosure, the Contractor must verify that all assemblies are complete, including deficiency long items, and all Contract requirements are met.

3.6 FUNCTIONAL PERFORMANCE TESTING

A. Objectives and Scope

1. The objective of Functional Performance Testing is to demonstrate that the building enclosure is performing according to documented design intent and Contract Documents. Functional Performance Testing ensures and documents that the building enclosure systems are fully operational. Additionally, during Functional Performance Testing, areas of deficient performance are identified and corrected, improving building enclosure system performance.

B. Development of Test Procedures

1. The purpose of a specific test is to verify and document compliance of the installed enclosure systems with the OPR. Building Enclosure Functional Performance Test Protocols are provided in other sections of the Project Specifications for specific requirements regarding BECx.

C. Coordination and Scheduling

1. Contractor must provide sufficient notice to BECA, through the Commissioner, regarding completion schedule for materials and systems. Testing to be performed in conjunction with site visits. Contractor must schedule Functional Performance Tests with Commissioning Team. BECA must witness and document functional testing of equipment and systems. BETA, as retained by the Contractor, must execute tests under direction of BECA.
2. Successful completion of Mock-up functional performance testing must occur prior to full production installation of building enclosure materials and systems.

3.7 DOCUMENTATION, NON-CONFORMANCE, AND APPROVAL OF TESTS

A. Documentation

1. BECA must witness and document results of FPT.

B. Non-Conformance

1. BECA must record results of functional testing. Deficiency or non-conformance issues must be noted and reported to the Commissioner. The Commissioner must provide such non-conformance reports to the CxA, Design Consultant, Contractor, and other entities, as needed.
2. Corrections of minor deficiencies identified may be made during tests at the discretion of the Commissioner and as recommended by the BECA. In such cases, deficiency and resolution must be documented.
3. Every effort must be made to expedite testing and minimize unnecessary delays, while not compromising integrity of tests.
4. Deficiencies are handled in the following manner:
   a) BECA documents deficiencies and notes Contractor's response and intentions. A finding of deficiency will not end the testing process.
   b) BECA submits deficiency report to the Commissioner. The Commissioner will provide such deficiency report to the CxA, Contractor, Design Consultant, and other entities as required.
   c) Contractor corrects deficiency and certifies that material or assembly is ready to be retested.
   d) Contractor informs Commissioner of retesting schedule for coordination with the BECA.
   e) Contractor reschedules test with the Commissioner and BETA at no additional cost to the City of New York.
   f) If a test must be witnessed more than twice by the BECA due to repeated failure to perform as per the design documents, the Contractor must be responsible for the BECA's fee for witnessing repeated tests beyond the second incidence. Such fee will be negotiated between the BECA and the Commissioner.

C. Testing

1. Costs for all testing and retesting required for the Project will be the responsibility of the Contractor. The Contractor is to provide access to the test specimens to the Commissioning Team, through the Commissioner.

3.8 COMMISSIONING DOCUMENTATION

A. Final Report Details

1. Final BECx Report must include an executive summary, list of participants and roles, brief building description, overview of Commissioning and testing scope, and general description of testing and verification methods. Report must contain evaluation regarding:
   a) Conformance to Specifications and design intent.
   b) Material/system installation.
   c) Functional performance.
2. All outstanding non-compliance items must be specifically listed.
3. Recommendations for improvement to system or operations, future actions, etc. must also be listed.

END OF SECTION 01 91 15

FMS ID: **P-1TREREC**

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

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

Department of Design and Construction

Contract for Furnishing all Labor and Material Necessary and Required for:

CONTRACT NO. 1 GENERAL CONSTRUCTION WORK

Walter Gladwin Recreation Center

LOCATION: **550 East Tremont Avenue**
BOROUGH: **Bronx, NY 10457**
CITY OF NEW YORK

Contractor

Dated _____ , 20 _____

Approved as to Form
Certified as to Legal Authority

Acting Corporation Counsel

Dated _____ , 20 _____

Entered in the Comptroller's Office

First Assistant Bookkeeper

Dated _____ , 20 _____

Department of Design and Construction

PROJECT ID: **P-1TREREC**

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

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

VOLUME 3 OF 3

ADDENDUM TO THE GENERAL CONDITIONS

SPECIFICATIONS

FOR FURNISHING ALL LABOR AND MATERIALS
NECESSARY AND REQUIRED FOR:

Walter Gladwin Recreation Center

LOCATION: **550 East Tremont Avenue**
BOROUGH: **Bronx, NY 10457**
CITY OF NEW YORK

CONTRACT NO. 1 **GENERAL CONSTRUCTION WORK**

NYC Department of Parks and Recreation

Marvel Architect

Date: **August 15, 2025**

Department of Design and Construction

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

ADDENDUM TO THE GENERAL CONDITIONS FOR SINGLE CONTRACT PROJECTS

The General Conditions are hereby amended in accordance with the terms and conditions set forth in this Addendum.

I. PROJECT DESCRIPTION

FMS #: **P-1TREREC**

PROJECT NAME: **Walter Gladwin Recreation Center**

PROJECT DESCRIPTION: This Project consists of a 40,000sf recreation and community center for the New York City Parks Department. The building will be sited on the north side of Walter Gladwin Park in the Bronx and aims to create an activity hub that serves the park and neighborhood while negotiating the transition from the city urban fabric to the park landscape. The primary building programs will include athletic facilities such as a gymnasium and cardio, strength, dance, and spin rooms as well as educational and administrative spaces. The building structure will consist primarily of mass timber glulam and CLT elements and its façade will be clad in a brick façade with large glazed openings.

PROJECT LOCATION: **550 East Tremont Avenue**
BOROUGH: **Bronx**
CITY OF NEW YORK
ZIP CODE: **10457**
COMMUNITY BOARD #: **Bronx Community Board 6**

LANDMARK STATUS:

DESIGNATED LANDMARK STRUCTURE OR SITE: ***NO***
If this is a Designated Landmark Structure or Site, Section 01 3591, Historic Treatment Procedures applies to this project.
LANDMARK QUALITY STRUCTURE: ***NO***
If this is a Landmark Quality Structure, Section 01 3591, Historic Treatment Procedures applies to this project.

II. LEED GREEN BUILDING REQUIREMENTS

This project must achieve a **Gold** LEED Green Building Rating. A certain number of credits are required for this rating and are detailed in the Addendum.

Sections 01 7419 Sub-Section 1.5(C) Waste Management Performance Requirements / LEED Certification, 01 8113.04 Sustainable Design Requirements for LEED v4 Buildings and 01 8119 Indoor Air Quality Requirements for LEED Buildings of the DDC Standard General Conditions apply to this project.

III. COMMISSIONING REQUIREMENTS

This project includes MEP and Building Enclosure Commissioning Requirements.

The General Commissioning Requirements for MEP Systems are found in Section 01 9113 of the DDC Standard General Conditions.

The General Commissioning Requirements for Building Enclosure are found in Section 01 9115 of the DDC Standard General Conditions.

Other specific Commissioning Requirements can be found in the Project Specification Sections.

IV. PROJECT MANAGEMENT

☐ DDC will publicly bid and enter into all contracts for the Project. DDC will manage the Project using its own personnel.

☒ DDC will publicly bid and enter into all contracts for the Project. A Construction Management firm (the "CM") hired by DDC will manage the Project. The Contractor is advised that the CM will serve as the representative of the Commissioner at the site and will, subject to review by the Commissioner, be responsible for the inspection, management, coordination and administration of the required construction work, as delineated in the article of the Standard Construction Contract entitled "The Resident Engineer".

V. CONTRACTS FOR THE PROJECT

The Project consists of a single contract, the Contract for General Construction Work. The Contractor for General Construction Work is responsible for the performance of all required work for the Project as set forth in the Contract Documents (General Conditions, Drawings and Specifications), including all responsibilities and obligations assigned to separate Contractors for the following subdivisions of the work: Plumbing Work, HVAC Work, and Electrical Work. All responsibilities and obligations in the Contract Documents assigned to separate Contractors for such subdivisions of the work are the responsibility of the Contractor for General Construction Work.

VI. SCHEDULES

The Contractor is advised that Schedules A through E are attached to, and incorporated as part of, this Addendum to the General Conditions. These schedules contain important information that is specific to this Project. The Contractor is advised to carefully review these schedules.

VII. APPLICABILITY OF SECTIONS/SUB-SECTIONS AND AMENDED SUB-SECTIONS

The Contractor is advised that various Sections/Sub-Sections in the General Conditions may not apply to this Project or may apply as amended. Such Sections/Sub-Sections advise the Contractor to "Refer to the Addendum for the applicability of this Section/Sub-Section." Such Sections/Sub-Sections are set forth below. A check mark indicates whether the Section/Sub-Section (1) applies to the Project, (2) does not apply to the Project, or (3) applies to the Project as amended. If no box is checked, the Section/Sub-Section, as set forth in the General Conditions, applies to the Project. Amended Sections/Sub-Sections, if any, are set forth following this list of Sections.

Section	Sub-Section	Sub-Section	Applies		Does not Apply		Applies as Amended
01 1000	1.4 (B)	Scope and Intent / LEED	X				
	1.4(C)	Scope and Intent / Commissioning	X				
01 2100.10		Price Adjustment Allowance			X		
01 2100.20		Expanded Work Allowance	X				
01 2100.30		Project Work Acceleration Allowance			X		
01 3216.10		Project Schedules (Method A)			X		
01 3216.20		Project Schedules (Method B)			X		
01 3216.30		Project Schedules (Method C)	X				
	1.7 Q	Cost Loaded Schedule	X				
01 3233		Photographic Documentation	X				
01 3300	1.7 (A-D)	LEED Submittals					X
01 3503		General Mechanical Requirements	X				
01 3506	3.2 (A-B)	Electrical Conduit System Including Boxes (Pull, Junction and Outlet)	X				
	3.3 (A-E)	Electrical Wiring Devices	X				
	3.4 (A-I)	Electrical Conductors and Terminations	X				
	3.5 (A-B)	Circuit Protective Devices	X				
	3.6 (A-J)	Distribution Centers	X				
	3.7 (A-I)	Motors	X				
	3.8 (A-I)	Motor Control Equipment	X				
01 3591		Historic Treatment Procedures			X		
01 5000	3.2 (A)	Temporary Water Facilities / Temporary Water	X				
	3.2 (B)	Temporary Water Facilities / Temporary Water – Work in Existing Facilities			X		
	3.3 (B)	Temporary Sanitary Facilities / Self-Contained Toilet Units	X				
	3.3 (C)	Temporary Sanitary Facilities / Existing Toilets			X		
	3.4 (B) 1	Temporary Power, Lighting, and Site Lighting / Connection to Utility Lines	X				
	3.4 (B) 2	Temporary Power, Lighting, and Site Lighting / Connection to Existing Electrical Power Service			X		
	3.4 (B) 3	Temporary Power, Lighting, and Site Lighting / Electrical Generator Power Service	X				
	3.4 (D)	Temporary Power, Lighting, and Site Lighting / Temporary Lighting	X				
	3.4 (E)	Temporary Power, Lighting, and Site Lighting / Site Security Lighting (for New Construction Only)	X				
	3.5 (A-J)	Temporary Heat	X				
	3.8 (A)	DDC Field Office / Office Space in Existing Building			X		

Section	Sub-Section	Sub-Section	Applies		Does not Apply		Applies as Amended
01 5000	3.8 (B)	DDC Field Office / DDC Field Office Trailer	X				
	3.8 (B-3a)	DDC Field Office / DDC Managed Field Office Trailer	X				
	3.8 (B-3b)	DDC Field Office / CM Managed Field Office Trailer	X				
	3.8 (D)	DDC Field Office / Additional Equipment for the DDC Field Office	X				
	3.13(A-D)	Work Fence Enclosure	X				
	3.14 (A-H)	Rodent and Insect Control	X				
	3.17(B)	Project Rendering	X				
	3.18 (A-D)	Security Guards / Fire Guards on Site	X				
01 5411	3.1 (A-J)	Temporary Use, Operation and Maintenance of Elevators During Construction for New Buildings Up To and Including 15 Stories	X				
	3.2 (A-M)	Temporary Use, Operation and Maintenance of Elevators During Construction for New Buildings Over 15 Stories			X		
	3.3 (A-E)	Temporary Use, Operation and Maintenance of Elevators During Construction for Existing Buildings			X		
01 5423	1.9 (A-C)	Sidewalk Sheds	X				
01 7300	3.3 (A-I)	Surveys	X				
	3.4 (A-B)	Borings	X				
	3.12 (A-D)	Sleeves and Hangers	X				
	3.13 (A)	Sleeve and Penetration Drawings	X				
	3.15 (A)	Location of Partitions	X				
01 7419	1.5 (C)	Waste Management Performance Requirements / LEED Certification					X
01 7900		Demonstration and Owner's Pre-Acceptance Orientation	X				
01 8113.04		Sustainable Design Requirements for LEED v4 Buildings					X
01 81 13.10		Environmentally Preferable Purchasing (EPP) Compliance			X		
01 8119		Indoor Air Quality Requirements for LEED Buildings					X
01 9113		General Commissioning Requirements for MEP Systems	X				
01 9115		General Commissioning Requirements for Building Enclosure	X				

AMENDED SECTIONS/SUB-SECTIONS

The Contractor is advised that the amended Sub-Sections set forth below are included in the General Conditions and apply to the Project.

Section 01 33 00 - SUBMITTAL PROCEDURES

a) Article 1.5 (A)(1)(c): Add "IT, AV, and Security systems" after "electrical systems."

b) Article 1.5 (B)(5): Add "and integrated waterproofing details for blind side waterproofing" after "housekeeping pads."

c) Article 1.6: Add (R) Processing Time: The Contractor must allow enough time for submittal review, including time for resubmittals, as follows.

1. Initial Review: Allow 15 working days for initial review of each submittal to be reviewed by a single consultant.
2. Resubmittal Review: Allow 10 working days for each subsequent review of each submittal to be reviewed by a single consultant.
3. Concurrent Consultant Review: Where the Contract Documents indicate or when it is agreed to by the Commissioner that submittals may be transmitted simultaneously to Commissioner and to Commissioner's consultants, allow 15 days for review of each submittal. Where more than 2 consultants are required to review a single submittal, allow an additional 5 working days for review for each additional consultant. Submittal will be returned to Commissioner before being returned to Contractor.
4. Shop Drawings: Allow 15 working days for the initial review of any shop drawings or other submittals in quantity equal to or less than 50 sheets if received during 5 consecutive working days. For each sheet or other item in excess of 50 sheets received in 5 working days, additional time will be required for review. The Commissioner will advise the Contractor of additional time required.

d) Add new Article 1.7 (F): LEED v4.1 Materials Reporting Form: Provide for all permanently installed products as outlined in section 01 81 13.04 – SUSTAINABLE DESIGN REQUIREMENTS FOR LEED V4 BUILDINGS.

Section 01 40 00 – QUALITY REQUIREMENTS

a) Article 1.7 (H): Add the following items before "1. Build mockups…"

1. Review minimum size of each mockup with Commissioner. In no case will any mockup be smaller than the size of at least 2 units of the products required for the mockup.
2. Obtain approval of products submittals, samples, and mockup shop-drawings prior to commencing work.
3. Mockup work must be constructed by the same contractor and managed by the same supervisory personnel who will be responsible for managing the final in-situ work.
4. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes intended for the final construction.
5. Tests must be performed under provisions identified in this section, the Commissioning Requirements and respective product specification sections.

b) Article 1.7 (H)(2): Replace (7) days with (15) days.

c) Article 1.7 (H)(3): Add after "workmanship," "the resolution of joints, material transitions, and complex geometries."

d) Article 1.7 (H)(6): Add after "indicated," "Unless specifically indicated, mock-ups are stand-alone mockups and are not part of the final construction that will be allowed to remain."

Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

a) Article 1.4 (A): In the definition for "Off-Site Sorting", first sentence, add the word "commingled or" before the word "combined".

b) Article 1.5 (D): Under Diversion Requirements, replace the entire paragraph with the following:

DIVERSION REQUIREMENTS. The Project must pursue LEED v4.1 criteria for MR credit 5: Construction & Demolition Waste Management, Option 1, based on LEED rating system addenda published 7/25/2019 (https://www.usgbc.org/leedaddenda/100002271), as follows:

1. LEED v4 projects with demolition ADC Waste: Minimum of seventy-five percent (75%) of total Project demolition and construction Waste (by weight) must be diverted from landfill through at least three (3) diverted material types (credit Option 1, Path 3).
2. LEED v4 projects with demolition ADC Waste: Minimum of fifty percent (50%) of total Project demolition and construction Waste (by weight) must be diverted from landfill through at least two (2) diverted material types (credit Option 1, Path 1).
3. The following Waste categories are likely candidates to be included in the diversion plan as applicable for this Project:

c) Article 1.5 (I): Add at the end of the sentence: "…however, must be included in total waste generated."

d) Article 1.6 (A)(2)(b): Note that Build it Green website has changed to www.bigreuse.org

Section 01 77 00 – CLOSEOUT PROCEDURES

a) Article 2.1 (A) Cleaning Agents: Add sentence "Use low or no VOC, low odor cleaning products."

b) Article 3.1 (C) Pest Control: After "other pests" add "…using Integrated Pest Management procedures…".

Section 01 81 13.04 – SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS

a) Article 1.3 Related Sections: Add the following sections:
   1. Section 01 33 00 - SUBMITTAL PROCEDURES
   2. Section 01 81 21 - SUSTAINABLE CONSTRUCTION REQUIREMENTS

b) Article 1.4 (A) DEFINITIONS: Under the definition for "Product", add to the last sentence: "…however, aesthetic variations alone (e.g., different color) does not qualify as a separate product.

c) Article 1.6 LEED Building Submittals: Replace the first paragraph with the following:

   Scope: LEED Building Submittals are required for all permanently installed materials included in General Construction work in Divisions 03-10, 31, and 32. For Plumbing, Mechanical and Electrical work and other work specified in any Division of the specifications, LEED Building Submittals are only required for field-applied, wet-applied adhesives, sealants, paints and coatings. Voluntary inclusion of system components such as piping, pipe insulation, ducts, conduits, plumbing fixtures, faucets and lamp housings must be consistently applied to the Project's LEED credits. Submit all required LEED Building Submittals in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

d) Article 1.6 (C)(1): Note the "Building Product Disclosure and Optimization (Disclosure and Optimization Calculator)" is currently referred to as the "LEED v4.1 Building Products Calculator" and is available for download at: https://www.usgbc.org/resources/leed-v41-building-products-calculator .

e) Article 1.6 (C)(1)(b): Replace "Contractor's labor" with "Contractor's on-site labor".

f) Article 1.6 (C)(1)(g), (h), and (i): Note that the project will be following LEED v4.1 criteria for MR Credits Environmental Product Declarations, Sourcing of Raw Materials, and Material Ingredients. The criteria and product weighted values listed in the specification are related to LEED v4 criteria. For LEED v4.1 credit criteria, refer to the LEED v4.1 Building Design & Construction Reference Guide.

g) Article 1.6 (C)(2): Note that for the LEED Indoor Environmental Quality Credit Low-Emitting Materials, the project will follow LEED v4.1 criteria. For v4.1 credit criteria, refer to the LEED v4.1 Building Design & Construction Reference Guide. The LEED v4.1 Low-Emitting Materials Calculator is available for download at: https://www.usgbc.org/resources/leed-v41-low-emitting-materials-calculator .

h) Article 1.6 (C)(2)(c)(1) VOC REQUIREMENTS FOR INTERIOR ADHESIVES AND SEALANTS: Replace the first sentence with the following for LEED v4.1:

   For field applications that are inside the weatherproofing system, use adhesives and sealants that comply with VOC limits listed in the South Coast Air Quality Management District (SCAQMD) Rule 1168, amended October 6, 2017.

i) Article 1.6 (C)(2)(d)(1) VOC REQUIREMENTS FOR INTERIOR PAINTS AND COATINGS : Replace the first sentence with the following for LEED v4.1:

For field applications that are inside the weatherproofing system, use paints and coatings that comply with the VOC limits listed in California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the SCAQMD Rule #1113 amended February 5, 2016, effective date January 1, 2019.

j) Article 1.7 LEED BUILDING SUBMITTAL REQUIREMENTS: Add new paragraph, in between current paragraphs A and B:

All LEED Submittals must include a LEED v4.1 Materials Reporting Form, completed for each product included in the submittal. LEED Submittals that do not include Materials Reporting Form(s) must be considered incomplete submittals and returned without review. A sample LEED v4.1 Materials Reporting Form is shown in APPENDIX 01 8113.04-C to the Specification. An editable version of the Materials Reporting Form will be provided to the Contractor.

k) Article 1.9 (C) QUALITY ASSURANCE: Note that the LEED Calculators to be distributed must be the LEED v4.1 versions of the Calculators, as outlined in the Amended Sub-sections above.

Section 01 81 19 – INDOOR AIR QUALITY REQUIREMENTS FOR LEED BUILDINGS

a) Article 1.7 (B)(1)(a)(2) under HVAC Protection: Replace sentence with the following: All ductwork arriving on site must be sealed with plastic sheeting during transportation and stored on pallets or dunnage until installed. Plastic seals must be maintained and kept in place for the duration of construction. Plastic seals removed during the work must be re-installed at the end of each workday.

b) Article 1.7 (B)(1)(b)(3) under Source Control: Replace sentence with the following: Use low-toxicity and low-VOC materials that meet VOC content limits as required in Section 01 81 13.04 - SUSTAINABLE DESIGN REQUIREMENTS FOR LEED v4 BUILDINGS, to the greatest extent possible.

c) Article 1.7 (B)(5) under Pre-Occupancy Phase: Replace first sentence with the following: As directed by the Commissioner, perform either a flush-out or air sample testing (Options 1 or 2, respectively), as outlined below and in the LEED BD+C v4 Reference Guide. Flush-out or Air Testing must be implemented after construction ends and the building has been completely cleaned, with all interior finishes and movable furnishings installed, and major VOC punch list items finished.

VIII. SPECIAL EXPERIENCE REQUIREMENTS FOR THE PROJECT

Refer to the PASSPort Questionnaire for Special Experience Requirements.

IX. REVISIONS: SPECIFICATIONS AND CONTRACT DRAWINGS

The Specifications and the Contract Drawings for the Project are revised in accordance with the provisions set forth below.

(1) Owner: Wherever the term "Owner" is used in the Specifications and/or the Contract Drawings, such term means the City of New York.

(2) Other Entities: In the event any entity other than the City of New York is referred to or named as the "Owner" in the Specifications and/or the Contract Drawings, the name of such other entity is deemed deleted and replaced with the "City of New York".

(3) Architect / Engineer: Wherever the words "Architect", "Engineer", "Architect / Engineer" or "Architect and/or Engineer" are used in the Specifications and/or the Contract Drawings, such words are deemed deleted and replaced with the word "Commissioner".

(4) Products / Manufacturers: Wherever the Specifications and/or the Contract Drawings require the Contractor to provide a particular product (i.e., material and/or equipment) from a designated manufacturer and/or vendor, the term "or approved equal" is deemed inserted, even if only one product and/or manufacturer is specified, except as otherwise provided below.
   (a) Proprietary Items: If the Documents section in PASSPort contains a Notice which identifies a particular product from a designated manufacturer as a "Sole Source Product, the Contractor is required to provide such specified product. In such case, no substitution or "approved equal" will be permitted.

(5) Special Experience Requirements: Special Experience Requirements for the Project, if any, are set forth in the PASSPort Questionnaire. Special Experience Requirements may apply to Contractors, subcontractors, installers, fabricators, applicators, erectors, specialists, manufacturers and/or suppliers. Refer to DDC General Conditions Section 014000 Article 1.7.C for applicable Special Experience qualification levels. If the Specifications and/or the Contract Drawings contain any Special Experience Requirement that is not set forth in the PASSPort Questionnaire, such Special Experience Requirement is deemed deleted, except as otherwise provided below.
   (a) Any Special Experience Requirement that provides that the entity performing the work or supplying the material must have more than three (3) years of experience, is revised to provide that the entity performing the work or supplying the material must have three (3) years of experience as noted in DDC General Conditions Section 014000 Quality Requirements, Article 1.7.B, except as described in paragraph (b) below.
   (b) Any Special Experience Requirement that pertains to the abatement of hazardous materials is not be subject to the deletion and/or revision set forth above. Such Special Experience Requirement remains in full force and effect.
   (c) Except as set forth in the DDC General Conditions Article 1.7, any Special Experience Requirement that provides that the individual workers performing the work must be licensed, authorized, certified, approved by or acceptable to the manufacturer, is deemed deleted and replaced with the requirement that such individual workers must be properly trained for the specified work.

(6) Alternate Bids: If the agency is requesting the submission of Alternate Bids, a Notice regarding such Alternate Bids is set forth in the Documents section in PASSPort. In the event of any conflict or inconsistency between (1) the Notice regarding Alternate Bids set forth in the Documents section in PASSPort and (2) a provision in the Specifications and/or the Contract Drawings regarding Alternate Bids, the Notice set forth in the Documents section in PASSPort will prevail. If the agency is not requesting the submission of Alternate Bids, as indicated by the absence of a Notice in the Documents section in PASSPort, and the Specifications and/or the Contract Drawings contain any provision regarding Alternate Bids, such provision is deemed deleted.

(7) Contractor Retained Engineer: If the Specifications and/or the Contract Drawings require the Contractor to retain an Engineer to provide engineering services for the Project, the following sentence is deemed inserted: "Such Engineer must be a Professional Engineer, licensed in the State of New York."

(8) LEED Related Provisions: If the Specifications and/or the Contract Drawings require the Contractor to purchase FSC certified wood, rapidly renewable materials, or materials within 500 miles (LEED v3) or 100 miles (LEED v4), such provisions are deemed deleted and replaced with the requirement that if the Contractor has purchased FSC certified wood, rapidly renewable materials, or materials within 500 miles (LEED v3) or 100 miles (LEED

v4), the Contractor must submit such forms or documentation as may be required by the City in order for the USGBC to certify that the Project qualifies for the related LEED credit(s).

(9) Guarantees: Requirements for Guarantees and Maintenance are set forth in Schedule B, which is included in the Addendum to the General Conditions. In the event of any conflict or inconsistency between (1) a guarantee and/or maintenance requirement set forth in the Specifications and/or the Contract Drawings and (2) a guarantee and/or maintenance requirement set forth in Schedule B, the guarantee and/or maintenance requirement set forth in Schedule B will prevail.

(10) Warranties: Requirements for Warranties are set forth in Schedule B, which is included in the Addendum to the General Conditions.

(a) The term "manufacturer's warranty" as described in this article encompasses the following terms as indicated in the Specifications: "Manufacturer's Warranty", "Manufacturer's Special Warranty", "Special Warranty", "Special Finish Warranty", "Manufacturer's Special Warranty for a (product, assembly)."

(b) In the event of any conflict or inconsistency between (1) a warranty requirement set forth in the Specifications and/or the Contract Drawings and (2) a warranty requirement set forth in Schedule B, the warranty requirement set forth in Schedule B will prevail.

(c) In the event a warranty requirement set forth in the Specifications and/or the Contract Drawings is omitted from Schedule B, such omission from Schedule B has no effect and the Contractor's obligation to provide the manufacturer's warranty, as set forth in the Specifications and/or the Contract Drawings, will remain in full force and effect.

(d) In the event a warranty requirement for a particular item of material or equipment is omitted from Schedule B, as well as from the Specifications or the Contract Drawings, and the manufacturer of such item actually provides a warranty, the Contractor is obligated to obtain and deliver to the Commissioner the highest level of warranty actually provided by that manufacturer.

(11) Exculpatory Provisions: In the event the Specifications and/or the Contract Drawings contain any provision whereby the consultant and/or any of its officers, employees or agents, including subconsultants, is absolved of responsibility for any act or omission, such provision is deemed deleted.

(12) Insurance: Provisions regarding insurance coverage the Contractor is required to provide are set forth in Article 22 of the City of New York Standard Construction Contract and Schedule A, which is included in the Addendum to the General Conditions. In the event the Specifications and/or the Contract Drawings contain any provision regarding insurance requirements, such provision is deemed deleted.

(13) Indemnification: Provisions regarding indemnification are set forth in Articles 7, 12, 22 and 57 of the City of New York Standard Construction Contract. In the event the Specifications and/or the Contract Drawings contain any provision regarding indemnification, such provision is deemed deleted.

(14) Dispute Resolution: Provisions regarding dispute resolution are set forth in Article 27 of the City of New York Standard Construction Contract. In the event the Specifications and/or the Contract Drawings contain any provision regarding dispute resolution, such provision is deemed deleted.

(15) Payment to Other Entities: In the event the Specifications and/or the Contract Drawings contain any provision which requires the Contractor to make payments to an entity other than a subcontractor and/or supplier providing services and/or material for the project, such provision is deemed deleted.

(16) General Conditions: In the event of any conflict or inconsistency between (1) the Specifications and/or the Contract Drawings and (2) the General Conditions, the General Conditions will prevail.

(17) Standard Construction Contract: In the event of any conflict or inconsistency between (1) the Specifications and/or the Contract Drawings and (2) the City of New York Standard Construction Contract, the City of New York Standard Construction Contract will prevail.

(18) Shall: Wherever the word "shall" is used in the Specifications and/or the Contract Drawings with respect to the Contractor's or Subcontractor's responsibilities or Project Requirements, the term is intended to convey a contractual mandate, such as the terms "must," "will," or "be obliged to" (and not "may").

SCHEDULE A (FOR PUBLICLY BID PROJECTS)
PART I – Contract Requirements

Various Articles of the Contract refer to requirements which are set forth in Schedule A of the General Conditions. The Schedule set forth below specifies the following: (1) the referenced Articles of the Contract, and (2) the specific requirements applicable to the contract.

REFERENCE	ITEM	REQUIREMENTS	CONTRACT #1
Information For Bidders	Bid Security	The Contractor must obtain a bid security in the amount indicated to the right.	Required provided the TOTAL BID PRICE set forth on the Bid Form is $1,000,000. Or more. Certified Check: 2% of Bid Amount or Bond: 10% of Bid Amount
Information For Bidders	Performance and Payment Bonds		For Contracts in the amount of $1,500,000.00 or more, Performance and Payment Bonds must each be in amount equal to 100% of the Contract Price.
Information For Bidders	Department of Design and Construction Safety Requirements	The Contractor must provide the safety personnel as indicated to the right	□ Project Safety Representative ■ Dedicated, full-time Project Safety Representative
Article 14 Contract	Time of Substantial Completion	Consecutive Calendar Days	**960**
Article 15 Contract	Liquidated Damages	For each consecutive calendar day over completion time	**$600**
Article 17 Contract	Sub-Contracts	Not to exceed Percent of Contract Price	**60%**
Article 21 Contract	Retainage	Percent of Voucher	If 100% bonds are required **5%** If 100% bonds are not required, and Contract Price is $1,000,000 or less **5%** If 100% bonds are not required, and Contract Price is more than $1,000,000 **10%**
Article 24 Contract	Deposit Guarantee	Percent of Contract Price	**1%**
Article 24 Contract	Period of Guarantee		See Schedule B of the Addendum to the General Conditions
Article 75 Contract	Compensation to be Paid to Contractor		Amount for which the Contract was Awarded: _____ _____ Dollars ($_____)
Article 79 Contract	MWBE Program		See M/WBE Utilization Plan in the PASSPort Procurement M/WBE Considerations Section.

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 – Insurance

PART II. Types of Insurance, Minimum Limits and Special Conditions

Note: All certificate(s) of insurance submitted pursuant to Contract Article 22.3. 3 must be accompanied by a Certification by Broker consistent with Part III below and include the following information:

- **For each insurance policy, the name and NAIC number of issuing company, number of policy, and effective dates;**
- **Policy limits consistent with the requirements listed below;**
- **Additional insureds or loss payees consistent with the requirements listed below; and**
- **The number assigned to the Contract by the City (in the "Description of Operations" field).**

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

Types of Insurance (per Article 22 in its entirety, including listed paragraph)	Minimum Limits and Special Conditions
■ Commercial General Liability Art. 22.1.1	This Contract requires Commercial General Liability Insurance (CGL) that is at least as broad as ISO Form CG 00 01 (see Section 22.1.1 of the New York City Standard Construction Contract). The minimum limits shall be $1,000,000.00 per occurrence and $2,000,000.00 per project aggregate applicable to this Contract unless the Work requires a permit from the Department of Buildings and greater limits of Commercial General Liability Insurances are required pursuant to 1 RCNY section 101-08. Additional Insureds: 1. City of New York, including its officials and employees, with coverage at least as broad as ISO Forms CG 20 10 and CG 20 37, and 2. All person(s) or organization(s), if any, that Article 22.1.1(b) of the **Contract** requires to be named as Additional Insured(s), with coverage at least as broad as ISO Form CG 20 26. The Additional Insured endorsement shall either specify the entity's name, if known, or the entity's title (e.g., Project Manager). 3. _____

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART II. Types of Insurance, Minimum Limits and Special Conditions

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

Types of Insurance (per Article 22 in its entirety, including listed paragraph)	Minimum Limits and Special Conditions
■ Workers' Compensation Art. 22.1.2 ■ Disability Benefits Insurance Art. 22.1.2 ■ Employers' Liability Art. 22.1.2 □ Jones Act Art. 22.1.3 □ U.S. Longshoremen's and Harbor Workers Compensation Act Art. 22.1.3	Workers' Compensation, Employers' Liability, and Disability Benefits Insurance: Statutory per New York State law without regard to jurisdiction. **Note**: The following forms are acceptable: (1) New York State Workers' Compensation Board Form No. C-105.2, (2) State Insurance Fund Form No. U-26.3, (3) New York State Workers' Compensation Board Form No. DB-120.1 and (3) Request for WC/DB Exemption Form No. CE-200. The City will not accept an ACORD form as proof of Workers' Compensation or Disability Insurance. Jones Act and U.S. Longshoremen's and Harbor Workers' Compensation Act: Statutory per U.S. law.
■ Builders' Risk Art. 22.1.4	100 % of total value of **Work** **Contractor** the Named Insured; the **City** both an Additional Insured and one of the loss payees as its interests may appear. Installation Floater not permitted. Note: Builders Risk Insurance may terminate upon **Substantial Completion** of the **Work** in its entirety.
■ Commercial Auto Liability Art. 22.1.5	$1,000,000.00 per accident combined single limit If vehicles are used for transporting hazardous materials, the **Contractor** shall provide pollution liability broadened coverage for covered vehicles (endorsement CA 99 48) as well as proof of MCS 90

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART II. Types of Insurance, Minimum Limits and Special Conditions

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

Types of Insurance (per Article 22 in its entirety, including listed paragraph)	Minimum Limits and Special Conditions
□ Contractor's Pollution Liability Art. 22.1.6	$_____ per occurrence $_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
□ Marine Protection and Indemnity Art. 22.1.7(a)	$_____ per occurrence $_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
□ Hull and Machinery Insurance Art. 22.1.7(b)	$_____ per occurrence $_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
□ Marine Pollution Liability Art. 22.1.7(c)	$_____ each occurrence Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
[OTHER] Art. 22.1.8 □ Ship Repairers Legal Liability	$_____ each occurrence

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART II. Types of Insurance, Minimum Limits and Special Conditions (Continued)

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

Types of Insurance (per Article 22 in its entirety, including listed paragraph)	Minimum Limits and Special Conditions
[OTHER] Art. 22.1.8 □ Collision Liability/Towers Liability	$_____ per occurrence $_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
[OTHER] Art. 22.1.8 □ Railroad Protective Liability _____	$_____ per occurrence $_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
[OTHER] Art. 22.1.8 □ Asbestos Liability _____	Only required of the Contractor or Subcontractor performing any required asbestos removal. $1,000,000 each occurrence, $2,000,000 aggregate (Combined Single Limit); only required of the Contractor or Subcontractor performing any required asbestos removal. Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART II. Types of Insurance, Minimum Limits and Special Conditions (Continued)

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

[OTHER] Art. 22.1.8 □ Boiler Insurance_____	$200,000
[OTHER] Art. 22.1.8 ■ Professional Liability In the event any section of the Specifications requires the Contractor to engage a Professional Engineer to provide design and/or engineering services, the Engineer engaged by the Contractor, as well as any sub consultant(s) performing professional services, shall provide Professional Liability Insurance.	$1,000,000 per occurrence The Contractor's Professional Engineer shall maintain and submit evidence of Professional Liability Insurance in the minimum amount of $1,000,000 per claim. The policy or policies shall include an endorsement to cover the liability assumed by the Contractor under this Agreement arising out of the negligent performance of professional services or caused by an error, omission or negligent act of the Contractor's Professional Engineer or anyone employed by the Contractor's Professional Engineer. Claims-made policies will be accepted for Professional Liability Insurance. All such policies shall have an extended reporting period option or automatic coverage of not less than two (2) years. If available as an option, the Contractor's Professional Engineer shall purchase extended reporting period coverage effective on cancellation or termination of such insurance unless a new policy is secured with a retroactive date, including at least the last policy year.
OTHER] Art. 22.1.8 □ Umbrella/Excess Liability Insurance The Contractor shall provide Umbrella/Excess Liability Insurance in the minimum amounts shown to the right. The policy terms and condition should be at least as broad as the underlying policies. The underlying policies should comply with the insurance provision as outlined by the contract. Defense cost should be in addition to the limit of liability. The City of New York, including its officials and employees, should be included as additional insured as respects to the noted project.	$10,000,000 per Occurrence and $10,000,000 in Aggregate

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART III. Certificates of Insurance

All certificates of insurance (except certificates of insurance solely evidencing Workers' Compensation Insurance, Employer's Liability Insurance, and/or Disability Benefits Insurance) must be accompanied by one of the following:

(1) the Certification by Insurance Broker or Agent on the following page setting forth the required information and signatures;

-- OR --

(2) copies of all policies as certified by an authorized representative of the issuing insurance carrier that are referenced in such certificate of insurance. If any policy is not available at the time of submission, certified binders may be submitted until such time as the policy is available, at which time a certified copy of the policy shall be submitted.

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART III. Certification by Insurance Broker or Agent

The undersigned insurance broker or agent represents to the City of New York that the attached Certificate of Insurance is accurate in all material respects.

_____
[Name of broker or agent (typewritten)]

_____
[Address of broker or agent (typewritten)]

_____
[Email address of broker or agent (typewritten)]

_____
[Phone number/Fax number of broker or agent (typewritten)]

_____
[Signature of authorized official or broker or agent]

_____
[Name and title of authorized official, broker or agent (typewritten)]

State of ……...)
) ss:
County of ……)

Sworn to before me this

_____ day of _____, 20__

_____
NOTARY PUBLIC FOR THE STATE OF_____

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART IV. Address of Commissioner

Wherever reference is made in Article 7 or Article 22 to documents to be sent to the **Commissioner** (e.g., notices, filings, or submissions), such documents must be sent via email to insurance@ddc.nyc.gov. Hard copies of such documents will no longer be required or accepted.

SCHEDULE B

Guarantees and Warranties

(Reference: Section 01 7839, Article 2.7 of the DDC Standard General Conditions)

GUARANTY FROM CONTRACTOR

(1) Contractor's Guaranty Obligation: The Contractor must promptly repair, replace, restore or rebuild, as the Commissioner may determine, any finished Work in which defects of materials or workmanship may appear or to which damage may occur because of such defects, during the one (1) year period subsequent to the date of Substantial Completion (or use and occupancy in accordance with the Contract), except for the areas of Work set forth below:

- Roofing, Waterproofing, and Joint Sealant Work. For these types of work, the guarantee period will be (2) two years.

- Trees and/or Plant Material. For trees and/or plant material furnished and installed, the guarantee period will be (2) two years. During the guarantee period, the Contractor must provide all maintenance services set forth in the Specifications.

(2) Guaranty Period: The obligation of the Contractor, and its Surety under the Performance Bond, is limited to the period(s) of time specified above.

(3) Other Provisions Deemed Deleted: In the event the Specifications and/or the Contract Drawings contain any provisions regarding guaranty requirements, such provisions are deemed deleted and replaced with the guaranty requirements set forth in this Schedule B.

****

WARRANTY FROM MANUFACTURER

(1) Contractor's Obligation to Provide Warranties: The items of material and/or equipment for which manufacturer warranties are required are listed below. For each item of material and/or equipment listed below, the Contractor must obtain a written warranty from the manufacturer. Such warranty must provide that the material or equipment is free from defects for the period set forth below and will be replaced or repaired within such specified period. The Contractor must deliver all required warranties to the Commissioner.

(2) Required Warranties:

Specification No.	Material or Equipment	Warranty Period
033000	SHEET VAPOR RETARDER & TERMITE BARRIER	10 years
061800	GLUED-LAMINATED AND CROSS-LAMINATED TIMBER	1 year
071326	SELF ADHERING SHEET WATERPROOFING SYSTEM	20 years
071416	COLD FLUID-APPLIED WATERPROOFING	5 years
074213.13	FORMED METAL WALL PANELS (MATERIALS AND WORKMANSHIP)	2 years
074213.13	FORMED METAL WALL PANELS (FINISHES)	20 years
074293	SOFFIT PANELS (MATERIALS AND WORKMANSHIP)	2 years
074293	SOFFIT PANELS (EXPOSED PANEL FINISH)	20 years
075600	PMMA / SBS HYBRID ROOFING SYSTEM	20 years
076200	SHEET METAL FLASHING AND TRIM (FINISH)	10 years

077100	ROOF COPING PANELS (FINISH)	20 years
077273	VEGETATED ROOF TRAYS (MATERIALS AND WORKMANSHIP)	10 years
079100	PREFORMED JOINT SEALS	5 years
079200	JOINT SEALANTS	5 years
084213	ALUMINUM FRAMED ENTRANCES (PERFORMANCE, MATERIALS, AND WORKMANSHIP)	10 years
084213	ALUMINUM FRAMED ENTRANCES (FACTORY APPLIED FINISH)	20 years
084213	ALUMINUM FRAMED ENTRANCES (ANODIZED FINISH)	5 years
084413	GLAZED ALUMINUM CURTAIN WALLS (PERFORMANCE, MATERIALS, AND WORKMANSHIP)	10 years
084413	GLAZED ALUMINUM CURTAIN WALLS (FACTORY APPLIED FINISH)	20 years
084413	GLAZED ALUMINUM CURTAIN WALLS (ANODIZED FINISH)	5 years
088000	GLAZING - COATED GLASS PRODUCTS, LAMINATED GLASS PRODUCTS, INSULATED GLASS, HEAT SOAKED OR TEMPERED GLASS	10 years
088300	MIRRORS	5 years
088813	FIRE-RATED GLAZING - Laminated Glass	10 years
088813	FIRE-RATED GLAZING - Tempered Glazing Units	5 years
088853	SECURITY GLAZING – Monolithic Polycarbonate Security Glazing, Insulating Security Glazing, and Bird Safety Film	10 years
096466	WOOD ATHLETIC FLOORING	3 years
096813	TILE CARPETING	10 years
097723	FABRIC WRAPPED PANELS	2 years
101419	DIMENSIONAL LETTER SIGNAGE	5 years
101423	PANEL SIGNAGE	5 years
102240	GLAZED INTERIOR WALL AND DOOR ASSEMBLIES	5 years
102813	TOILET ACCESSORIES - Mirrors	10 years
102813	TOILET ACCESSORIES - Hand Dryers	5 years
104416	FIRE EXTINGUISHERS	6 years
105126	PLASTIC LOCKERS	10 years
111136	VEHICLE CHARGERING EQUIPMENT	2 years
113010	APPLIANCES	5 years
116623	GYMNASIUM EQUIPMENT	5 years
116653	GYMNASIUM DIVIDERS	5 years
126600	TELESCOPING STANDS	5 years
142400	HYDRAULIC ELEVATORS	5 years
221116	PIPING AND FITTINGS	10 years
221123.13	DOMESTIC WATER PACKAGED BOOSTER PUMP	1 year
221329	SANITARY SEWAGE EJECTOR	5 years
221429	SUMP PUMP	10 years
223300	ELECTRIC DOMESTIC WATER HEATER	25 years
232123	HYDRONIC PUMP	1 year

233416	CENTRIFUGAL HVAC FANS	1 year
233423	HVAC POWER VENTILATERS	1 year parts
233600	AIR TERMINAL UNITS	1 year
237223.23	PACKAGED ENERGY-RECOVERY UNITS	1 year
237416.13	PACKAGED, LARGE-CAPACITY, ROOFTOP AC UNITS	1 year parts & 5 years compressor
237433	DOAS - DEDICATED OUTDOOR AIR UNITS	1 year parts & 5 years compressor
238129	VARIABLE REFRIGERANT FLOW HVAC SYSTEMS	10 years
238233	CONVECTORS	1 year
238236	FINNED-TUBE RADIATION HEATERS	1 year
238239.16	PROPELLER UNIT HEATERS	1 year
238239.19	WALL AND CEILING UNIT HEATERS	1 year
238413.23	DIRECT STEAM INJECTION HUMIFIDIERS	2 years
238416.16	INDOOR, MECHANICAL DEHUMIDIFICATION UNITS	2 years
260923	LIGHTING CONTROL DEVICES	4 years
262413	SWITCHBOARDS	3 years
262416	PANELBOARDS	4 years
262713	METERING EQUIPMENT	3 years
262726	WIRING DEVICES	5 years
262816	ENCLOSED SWITCHES AND CIRCUIT BREAKERS	3 years
265000	L01 FIXTURE	10 years
	BALANCE OF FIXTURES, LI-ION AND NI-CD BATTERIES	5 years
265613	LIGHTING POLES AND STANDARDS	5 years
271100	COMMUNICATIONS EQUIPMENT ROOM FITTINGS	3 years
271513	COMMUNICATIONS COPPER HORIZONTAL CABLING	15 years
281000	ACCESS CONTROL SYSTEM	3 years
281523	INTERCOM ENTRY SYSTEMS	3 years
282000	VIDEO SURVEILLANCE	3 years
283100	INTRUSION DETECTION	3 years
284621.11	ADDRESSABLE FIRE-ALARM SYSTEMS	3 years
321400	CONCRETE PAVER	5 years
323300	IRON BENCH COMPONENTS	10 years
323300	RECYCLED PLASTIC LUMBER COMPONENTS	25 years
323300	SQUARE, COATED STEEL TABLES	3 years
323300	TRASH CONTAINER	5 years

(3) Application: The obligations under the warranty for the periods specified above apply only to the manufacturer of the material or equipment, and not to the Contractor or its Surety; provided, however, the Contractor retains responsibility for obtaining all required warranties from the manufacturers and delivering the same to the Commissioner.

(4) Other Provisions: The warranty requirements set forth in this Schedule B are also included in the Specifications.

(a) In the event of any conflict between a warranty requirement set forth in the Specifications and a warranty requirement set forth in Schedule B, the warranty requirement set forth in Schedule B will take precedence.

(b) In the event a warranty requirement set forth in the Specifications is omitted from Schedule B, such omission from Schedule B will have no effect and the Contractor's obligation to provide the manufacturer's warranty, as set forth in the Specifications, will remain in full force and effect.

(c) In the event a warranty requirement for a particular item of material or equipment is omitted from both Schedule B and the Specifications, and the manufacturer of such item actually provides a warranty, the Contractor is obligated to obtain and deliver to the Commissioner the highest level of warranty actually provided by that manufacturer.

(d) In the event a warranty requirement is provided for a particular item of material or equipment, and such requirement specifies a warranty period that is longer than that which is actually provided by any of the specified manufacturers, the Contractor is obligated to obtain and deliver to the Commissioner the highest level of warranty actually provided by any of the specified manufacturers, unless otherwise directed in writing by the Commissioner.

(e) Unless indicated otherwise, Warranties are to take effect on the date of Substantial Completion.

SCHEDULE C
Contract Drawings
(Reference: Section 01 1000, Article 1.5 (A) of the DDC Standard General Conditions)

The Schedule set forth below lists all Contract Drawings for the Project.

00-TITLE

T-000	TITLE PAGE

01-GENERAL

G-001	SHEET INDEX
G-002	GENERAL NOTES AND PROJECT SUMMARY
G-003	ABBREVIATIONS AND SYMBOLS
G-004	ACCESSIBILITY NOTES
G-005	ACCESSIBILITY DIAGRAMS
G-006	ACCESSIBILITY DIAGRAMS
G-007	SURVEY
G-008	SURVEY
G-009	SURVEY
G-010	SURVEY
G-011	SURVEY
G-012	TREE SURVEY
G-013	TREE SURVEY
G-014	TREE SURVEY
G-015	TREE SURVEY
G-016	TREE SURVEY
G-017	TREE SURVEY
G-018	TREE SURVEY
G-019	EGRESS AND LIFE SAFETY
G-020	ROOF DIAGRAMS
G-021	TYPICAL INTERIOR MOUNTING HEIGHTS

02-ZONING

Z-000	ZONING MAP & FLOOD MAPS

03-DEMOLITION

D-001	SITE DEMOLITION PLAN

04-ARCH

A-000	SITE PLAN
A-100	CELLAR PLAN
A-101	LEVEL 1 PLAN
A-102	LEVEL 2 PLAN
A-103	ROOF PLAN
A-109	GEOMETRY CONTROL PLAN

A-110	CELLAR SLAB EDGE PLAN
A-111	LEVEL 1 SLAB EDGE PLAN
A-112	LEVEL 2 SLAB EDGE PLAN
A-113	ROOF SLAB EDGE PLAN
A-120	CELLAR FINISH FLOOR PLAN
A-121	LEVEL 1 FINISH FLOOR PLAN
A-122	LEVEL 2 FINISH FLOOR PLAN
A-150	CELLAR RCP
A-151	1ST FLOOR RCP
A-152	2ND FLOOR RCP
A-200	ENLARGED PLAN - CELLAR
A-201	ENLARGED PLAN - 1ST FLOOR - LOBBY
A-202	ENLARGED PLAN - 1ST FLOOR - WEST WING
A-203	ENLARGED PLAN - 1ST FLOOR - GYMNASIUM
A-204	ENLARGED PLAN - 1ST FLOOR - SOUTH WING
A-205	ENLARGED PLAN - 2ND FLOOR - CENTER
A-206	ENLARGED PLAN - 2ND FLOOR - WEST WING
A-207	ENLARGED PLAN - 2ND FLOOR - GYMNASIUM TRACK
A-208	ENLARGED PLAN - 2ND FLOOR - SOUTH WING
A-209	ENLARGED PLAN - ROOF - CENTRAL
A-300	BUILDING MASSING - AXONOMETRIC
A-301	GENERAL BLDG ELEVATIONS
A-302	WING ELEVATIONS - WEST WING
A-303	WING ELEVATIONS - GYM
A-304	WING ELEVATIONS - SOUTH WING
A-310	ENLARGED ELEVS - RETAINING WALLS
A-320	BUILDING SECTION
A-321	BUILDING SECTION
A-350	FACADE MOCK-UP DWGS
A-400	WALL SECTIONS
A-401	WALL SECTIONS
A-402	WALL SECTIONS
A-403	WALL SECTIONS - FOUNDATIONS
A-404	WALL SECTIONS
A-410	ENLRG GLAZING - WEST WING
A-411	ENLRG GLAZING - GYM
A-412	ENLRG GLAZING - SOUTH WING
A-413	ENLRG GLAZING - LOBBY SOUTH
A-414	ENLRG GLAZING - LOBBY NORTH ENTRY
A-415	ENLRG GLAZING - MULTIPURPOSE RMS
A-420	ENLARGED TYP FACADE ELEV
A-421	TYP DETAILS - BRICK TYP DETAILS
A-422	TYP DETAILS - SECTION DETAILS
A-423	TYP DETAILS - ROOF

A-424	TYP DETAILS - ROOF
A-425	TYP DETAILS - GRADE
A-426	TYP DETAILS - GRADE
A-427	TYP DETAILS - GRADE
A-428	TYP DETAILS - LINTELS
A-429	TYP DETAILS - TYP CW AND EXTERIOR HM
A-432	TYP BRICK DETAILS - PLAN
A-433	TYP GLAZING - PLAN DETAILS
A-434	TYP GLAZING - PLAN DETAILS
A-440	FOUNDATION DETAILS - KEY DIAGRAM
A-441	FOUNDATION DETAILS
A-442	FOUNDATION DETAILS
A-445	TYP FOUNDATION WATERPROOFING DETAILS
A-450	ROOF ASSEMBLIES
A-451	ROOF DETAILS - CONVENTIONAL ROOF
A-452	ROOF DETAILS - IRMA ROOF
A-453	ROOF DETAILS - MISC
A-455	TYP ROOF & BULKHEAD - PLAN DETAILS
A-500	LOBBY STAIR DWGS
A-501	STAIR A - PLANS & SECTIONS
A-502	STAIR B & C PLANS & SECTIONS
A-503	TYPICAL METAL PAN EGRESS STAIR DETAILS
A-504	TYPICAL CONCRETE LOBBY STAIR DETAILS
A-510	RAILING DETAILS ROOF & GYM TRACK
A-550	ELEVATOR PLANS & SECTION
A-551	TYPICAL ELEVATOR & PIT AND ACCESS LADDER DETAILS
A-600	INTERIOR AND EXTERIOR FINISH SCHEDULE
A-610	PLUMB. FIXT & ACCESSORIES SCHEDULE
A-620	PARTITION TYPES
A-621	PARTITION TYPES
A-622	TYPICAL FRAMED PARTITION DETAILS
A-623	TYPICAL SHAFTWALL AND RATED DETAILS
A-624	TYPICAL INTERIOR MASONRY WALL DETAILS
A-630	DOOR TYPES & SCHEDULE
A-631	TYPICAL DOOR DETAILS
A-640	EXT.WINDOW DWGS & SCHEDULE
A-641	INT WINDOW DWGS & SCHEDULE
A-642	ENLARGED GLAZING - INTERIOR
A-643	ENLARGED GLAZING - INTERIOR
A-645	INTERIOR GLAZING DETAILS
A-646	INTERIOR GLAZING DETAILS
A-700	INTERIOR ELEVATIONS - GYMNASIUM
A-701	INTERIOR ELEVATIONS - GYMNASIUM
A-702	INTERIOR ELEVATIONS - CARDIO ROOM

A-703	INTERIOR ELEVATIONS - STRENGTH ROOM
A-704	INTERIOR ELEVATIONS - OFFICES
A-705	INTERIOR ELEVATIONS - STRETCH & SPIN ROOM
A-706	INTERIOR ELEVATIONS - DANCE ROOM
A-707	INTERIOR ELEVATIONS - CLASSROOM
A-708	INTERIOR ELEVATIONS - AFTER SCHOOL ROOM
A-709	INTERIOR ELEVATIONS - TEEN RM & MEDIA LAB
A-710	INTERIOR ELEVATIONS - L1 LOBBY
A-711	INTERIOR ELEVATIONS - L2 LOBBY
A-730	LOCKER ROOMS - ENLARGED DRAWINGS
A-731	LOCKER ROOMS - ENLARGED DRAWINGS
A-732	LOCKER ROOMS - ENLARGED DRAWINGS
A-733	L2 RESTROOMS - ENLARGED DRAWINGS
A-734	L2 RESTROOMS - ENLARGED DRAWINGS
A-735	WELLNESS & OFFICE KITCHENETTE - ENLARGED DWGS
A-740	INTERIOR ELEVATIONS - MASONRY WALLS
A-741	INTERIOR ELEVATIONS - MASONRY WALLS
A-800	TYP HORIZONTAL FLOOR ASSEMBLIES
A-801	TYPICAL BASE DETAILS
A-802	TYPICAL FLOOR THRESHOLD DETAILS
A-810	INTERIOR DETAILS - FLR SECTIONS
A-811	INTERIOR DETAILS - SECTIONS
A-812	INTERIOR PLAN DETAILS
A-813	INTERIOR DETAILS - SHADES
A-820	GYMNASIUM DETAILS
A-821	GYMNASIUM DETAILS
A-830	CEILING DETAILS
A-831	CEILING & LIGHTING DETAILS
A-850	MILLWORK TYPES & DETAILS
A-851	INT MILLWORK RECEPTION DESK
A-860	LOBBY ACCENT WALLS
A-900	EXTERIOR SIGNAGE
A-910	SIGN TYPES
A-911	SIGN TYPES
A-912	SIGN TYPES
A-913	SIGN TYPES
A-920	SIGNAGE DETAILS
A-930	SIGNAGE PLAN - CELLAR
A-931	SIGNAGE PLAN - LEVEL 1
A-932	SIGNAGE PLAN - LEVEL 2
A-933	SIGNAGE PLAN - ROOF
A-950	SIGNAGE SCHEDULE

05-ENERGY

EN-000	SHEET LIST
EN-001	GENERAL NOTES
EN-002	ENVELOPE COMCHECK
EN-003	THERMAL BOUNDARY DIAGRAMS
EN-004	ELEVATIONS
EN-005	AREAS PER FACADE
EN-006	PLANS
EN-007	WINDOW TYPES
EN-008	THERMAL ASSEMBLIES
EN-009	THERMAL ASSEMBLIES
EN-010	THERMAL BRIDGE DOCUMENTATION
EN-011	AIR BARRIER CONTINUITY PLAN
EN-012	TYP BRICK DETAILS - PLAN
EN-013	TYP DETAILS - ROOF
EN-014	TYP DETAILS - SECTION DETAILS
EN-015	TYP DETAILS - GRADE
EN-016	TYP DETAILS - TYP CW AND EXTERIOR HM
EN-020	ENERGY COMPLIANCE
EN-021	ENERGY COMPLIANCE
EN-022	ENERGY COMPLIANCE
EN-023	ENERGY COMPLIANCE
EN-037	ENERGY CODE COMPLIANCE SHEET

06-CIVIL

BPP-100	SITE PLAN
BPP-101	GRADING PLAN AND PROFILE
BPP-102	PHOTO KEY MAP
BPP-103	PHOTOS
BPP-104	PHOTOS
BPP-105	PHOTOS
BPP-106	PHOTOS
BPP-107	PHOTOS
BPP-108	PHOTOS
BPP-109	PHOTOS
BPP-110	PHOTOS
BPP-111	PHOTOS
BPP-112	PHOTOS
BPP-113	PHOTOS
BPP-114	BPP DETAILS
BPP-115	TAX AND ZONING MAPS
C-001	COVER PAGE
C-100	SITE DEMOLITION PLAN
C-101	SITE EROSION AND SEDIMENT CONTROL PLAN
C-102	EROSION AND SEDIMENT CONTROL DETAILS

C-103	EXISTING DRAINAGE SITE PLAN
C-104	SITE PLAN
C-105	GRADING AND DRAINAGE PLAN
C-106	DETENTION TANK DETAILS
C-107	SITE UTILITY PLAN
C-108	SITE DETAILS
C-109	SITE DETAILS
C-110	DRAINAGE AREA MAP

07-LANDSCAPE

L-000	INDEX
L-001	GENERAL NOTES
L-002	TREE REMOVAL PLAN
L-003	TREE IMPACT MITIGATION TABLE
L-004	TREE IMPACT MITIGATION TABLE
L-005	TREE IMPACT MITIGATION TABLE
L-006	TREE IMPACT MITIGATION TABLE
L-007	TREE PROTECTION DETAILS
L-010	SITE KEY PLAN
L-101	LAYOUT PLAN
L-102	LAYOUT PLAN
L-103	LAYOUT PLAN
L-104	LAYOUT PLAN
L-122	BOULDER LAYOUT ENLARGEMENT
L-201	MATERIALS PLAN
L-202	MATERIALS PLAN
L-203	MATERIALS PLAN
L-204	MATERIALS PLAN
L-211	SITE PAVING PLAN
L-212	SITE PAVING PLAN
L-400	PLANTING SCHEDULE
L-401	PLANTING PLAN - TREES
L-402	PLANTING PLAN - TREES
L-403	PLANTING PLAN - TREES
L-404	PLANTING PLAN - TREES
L-411	PLANTING PLAN - UNDERSTORY
L-412	PLANTING PLAN - UNDERSTORY
L-413	PLANTING PLAN - UNDERSTORY
L-414	PLANTING PLAN - UNDERSTORY
L-800	LANDSCAPE SECTIONS
L-801	LANDSCAPE SECTIONS
L-900	SITE DETAILS
L-910	SITE DETAILS
L-920	SITE DETAILS

L-921	SITE DETAILS
L-930	SITE DETAILS
L-940	SITE DETAILS

08-STRUCTURAL

FO-000	COVER SHEET
FO-001	FOUNDATIONS GENERAL NOTES
FO-002	LEGEND
FO-101	CELLAR PLAN
FO-102	FIRST FLOOR FRAMING PLAN
FO-301	FOUNDATION SECTIONS
FO-302	FOUNDATION SECTIONS
FO-501	FOUNDATION TYPICAL DETAILS
FO-502	FOUNDATION TYPICAL DETAILS
FO-503	FOUNDATION TYPICAL DETAILS
FO-504	FOUNDATION TYPICAL DETAILS
FO-505	FOUNDATION TYPICAL DETAILS
FO-506	ROCK ANCHOR DETAILS
FO-507	FOUNDATION SCHEDULES
S-001	GENERAL NOTES
S-002	LEGEND
S-101	SECOND FLOOR FRAMING PLAN
S-102	ROOF FRAMING PLAN
S-103	LOBBY STAIR PLANS
S-104	STAIR PART PLANS
S-201	ELEVATIONS
S-202	DIAPHRAGM REINFORCING PLANS
S-203	SECOND FLOOR BEAM/GIRDER PENETRATION PLAN
S-204	ROOF BEAM/GIRDER PENETRATION PLAN
S-401	SUPERSTRUCTURE SECTIONS
S-402	SUPERSTRUCTURE SECTIONS
S-501	TYPICAL DETAILS
S-502	TYPICAL DETAILS
S-503	TYPICAL DETAILS
S-601	SCHEDULES

09-MECHANICAL

M-001	MECHANICAL COVER SHEET
M-100	MECHANICAL CELLAR PLAN
M-101	MECHANICAL FIRST FLOOR PLAN
M-102	MECHANICAL SECOND FLOOR PLAN
M-103	MECHANICAL ROOF PLAN
M-104	MECHANICAL CELLAR PIPING
M-105	MECHANICAL FIRST FLOOR PIPING

M-106	MECHANICAL SECOND FLOOR PIPING
M-107	MECHANICAL ROOF PIPING PLAN
M-108	MECHANICAL AIR & PIPING DIAGRAM
M-109	MECHANICAL ELEVATIONS 1
M-110	MECHANICAL ELEVATIONS 2
M-111	MECHANICAL ELEVATION 3
M-200	MECHANICAL SCHEDULES
M-300	MECHANICAL DETAILS 1
M-301	MECHANICAL DETAILS 2
M-302	MECHANICAL DETAILS 3
M-400	MECHANICAL BMS LEGEND KEY
M-401	MECHANICAL BMS DIAGRAM
M-402	CONTROLS FLOW DIAGRAM 1
M-403	CONTROLS FLOW DIAGRAM 2
M-404	CONTROLS FLOW DIAGRAM 3
M-405	CONTROLS FLOW DIAGRAM 4
M-406	MECHANICAL BMS POINT LIST 1
M-407	MECHANICAL BMS POINT LIST 2

10-PLUMBING

P-000	PLUMBING COVER SHEET
P-100	PLUMBING UNDERGROUND & CELLAR FLOOR PLAN
P-101	PLUMBING LEVEL 1 FLOOR PLAN
P-102	PLUMBING LEVEL 2 FLOOR PLAN
P-103	PLUMBING ROOF PLAN
P-200	PLUMBING DOMESTIC WATER RISER DIAGRAM
P-201	PLUMBING SANITARY RISER DIAGRAM
P-202	PLUMBING STORMWATER RISER DIAGRAM
P-300	PLUMBING DETAILS
P-301	PLUMBING DETAILS
P-400	PLUMBING SCHEDULES

11-FIRE PROTECTION

FP-000	FIRE PROTECTION COVER SHEET
FP-100	FIRE PROTECTION CELLAR FLOOR PLAN
FP-101	FIRE PROTECTION LEVEL 1 FLOOR PLAN
FP-102	FIRE PROTECTION LEVEL 2 FLOOR PLAN
FP-103	FIRE PROTECTION ROOF PLAN
FP-200	FIRE PROTECTION RISER
FP-300	FIRE PROTECTION DETAILS

12-ELECTRICAL

E-001	ELECTRICAL COVER SHEET

E-002	ELECTRICA SITE LIGHTING REMOVAL PLAN
E-003	ELECTRICAL SITE LIGHTING PLAN
E-004	ELECTRICAL SITE LIGHTING DETAILS
E-100	ELECTRICAL CELLAR PLAN
E-101	ELECTRICAL FIRST FLOOR PLAN
E-102	ELECTRICAL SECOND FLOOR PLAN
E-103	ELECTRICAL ROOF PLAN
E-200	ELECTRICAL CELLAR LIGHTING PLAN
E-201	ELECTRICAL FIRST FLOOR LIGHTING PLAN
E-202	ELECTRICAL SECOND FLOOR LIGHTING PLAN
E-203	ELECTRICAL ROOF LIGHTING PLAN
E-204	LIGHTING FIXTURE SCHEDULE
E-205	LIGHTING CONTROLS INTENT
E-206	LIGHTING CONTROLS INTENT
E-300	ELECTRICAL ONE-LINE DIAGRAM
E-301	ELECTRICAL PANEL SCHEDULES
E-302	ELECTRICAL DETAILS
E-303	CON EDISON DETAILS

13-FIRE ALARM

FA-001	FIRE ALARM COVER SHEET
FA-100	FIRE ALARM CELLAR PLAN
FA-101	FIRE ALARM FIRST FLOOR PLAN
FA-102	FIRE ALARM SECOND FLOOR PLAN
FA-103	FIRE ALARM ROOF PLAN
FA-200	FIRE ALARM RISER DIAGRAM

14-SECURITY

TY-000	SECURITY COVER SHEET
TY-001	SECURITY BUILDING RISER
TY-100	SECURITY PLAN - CELLAR
TY-101	SECURITY PLAN - LEVEL 1
TY-102	SECURITY PLAN - LEVEL 2
TY-103	SECURITY PLAN - ROOF
TY-130	SECURITY CEILING PLAN - CELLAR
TY-131	SECURITY CEILING PLAN - LEVEL 1
TY-132	SECURITY CEILING PLAN - LEVEL 2
TY-701	SECURITY EQUIPMENT DETAILS

15-TELECOMMUNICATIONS

TN-000	TELECOM COVER SHEET
TN-001	TELECOM RISER
TN-100	TELECOM PLAN - CELLAR
TN-101	TELECOM PLAN - LEVEL 1

TN-102	TELECOM PLAN - LEVEL 2
TN-103	TELECOM PLAN - ROOF
TN-130	TELECOM CEILING PLAN - CELLAR
TN-131	TELECOM CEILING PLAN - LEVEL 1
TN-132	TELECOM CEILING PLAN - LEVEL 2
TN-601	TELECOM ENLARGED PLANS
TN-701	TELECOMS EQUIPMENT DETAILS
TN-702	TELECOM EQUIPMENT DETAILS

16-AUDIOVISUAL

TA-000	AUDIOVISUAL COVER SHEET
TA-100	AUDIOVISUAL OVERALL PLAN - CELLAR
TA-101	AUDIOVISUAL OVERALL PLAN - LEVEL 1
TA-102	AUDIOVISUAL OVERALL PLAN - LEVEL 2
TA-130	AUDIOVISUAL OVERALL CEILING PLAN - CELLAR
TA-131	AUDIOVISUAL OVERALL CEILING PLAN - LEVEL 1
TA-132	AUDIOVISUAL OVERALL CEILING PLAN - LEVEL 2
TA-601	AUDIOVISUAL ENLARGED VIEWS - AV/IT EQUIPMENT ROOM (004)
TA-602	AUDIOVISUAL ENLARGED VIEWS - LOBBY (101)
TA-603A	AUDIOVISUAL ENLARGED VIEWS - GYMNASIUM (134)
TA-603B	AUDIOVISUAL ENLARGED VIEWS - GYMNASIUM (134)
TA-603C	AUDIOVISUAL ENLARGED VIEWS - GYMNASIUM (134)
TA-603D	AUDIOVISUAL ENLARGED VIEWS - GYMNASIUM (134)
TA-603E	AUDIOVISUAL ENLARGED VIEWS - GYMNASIUM (134)
TA-604	AUDIOVISUAL ENLARGED VIEWS - STRENGTH ROOM (129)
TA-605	AUDIOVISUAL ENLARGED VIEWS - CARDIO (106)
TA-606	AUDIOVISUAL ENLARGED VIEWS - OFFICE (115)
TA-607	AUDIOVISUAL ENLARGED VIEWS - STRETCH AND SPIN RM (203)
TA-608	AUDIOVISUAL ENLARGED VIEWS - MULTIPURPOSE 1 (212)
TA-609	AUDIOVISUAL ENLARGED VIEWS - MULTIPURPOSE 2 (211)
TA-610	AUDIOVISUAL ENLARGED VIEWS - MULTIPURPOSE 3 (201)
TA-611	AUDIOVISUAL ENLARGED VIEWS - MULTIPURPOSE 4 (209)
TA-612	AUDIOVISUAL ENLARGED VIEWS - MULTIPURPOSE 4 (209)
TA-701	AUDIOVISUAL EQUIPMENT DETAILS
TA-702	AUDIOVISUAL EQUIPMENT DETAILS
TA-801	AUDIO VISUAL SYSTEM FLOW DIAGRAMS
TA-802	AUDIO VISUAL SYSTEM FLOW DIAGRAMS
TA-803	AUDIO VISUAL SYSTEM FLOW DIAGRAMS
TA-804	AUDIO VISUAL SYSTEM FLOW DIAGRAMS

17-SUPPORT OF EXCAVATION

SOE-001	GENERAL NOTES
SOE-101	SUPPORT OF EXCAVATION PLAN

SOE-301	SECTIONS
SOE-302	SECTIONS
SOE-303	SECTIONS
SOE-304	SECTIONS
SOE-501	SUPPORT OF EXCAVATION DETAILS

SCHEDULE D

Electrical Motor Control Equipment

(Reference: 01 3506, Article 3.8 of the DDC Standard General Conditions)

Requirements for electrical motor equipment may be included in one or more sections of the Specifications for the Contract for the Project. Schedule D set forth below delineates specific information for electrical motor control equipment. In the event of any conflict between the Specifications and this Schedule D, Schedule D will take precedence; provided, however, in the event of an omission from Schedule D (i.e., Schedule D omits either a reference to or information concerning electrical motor equipment which is set forth in the Specifications), such omission from Schedule D will have no effect and the Contractor's obligation with respect to the electrical motor control equipment, as set forth in the Specifications, will remain in full force and effect.

DB Disconnect Circuit Breaker (Switch)
TS Thermal Switch
MS Magnetic Starter
CMS Comb. Mag. Starter
P Pilot Light
F Firestat
T Thermostat
AL Alternator
BG Break Glass Station
HOA Hand-Off Auto.
PB Push Button Station
RO Remote "off"

Equip. Ident.	Location	# of Units	HP or KW	Volts and Phase	Control Type: See legend above	Remarks:
RTU-1	ROOF	1	SUPPLY: (2) 15 HP/FAN EXHAUST: (2) 10 HP/FAN	208/3	DB	4 FANS
DOAS-1	ROOF	1	SUPPLY: 7.5 HP EXHAUST: 5 HP	208/3	DB	2 FANS
ERV-1	ROOF	1	SUPPLY: 2 HP EXHAUST: 3 HP	208/3	DB	2 FANS
ACCU-1 &ACCU-4	ROOF	2	12.04 KW OR 16.1 HP	208/3	DB	
ACCU-2	ROOF	1	10.43 KW OR 14.0 HP	208/3	DB	
ACCU-3	ROOF	1	13.64 KW OR 18.3 HP	208/3	DB	
ACCU-5	ROOF	1	14.84 KW OR 19.9 HP	208/3	DB	
ACCU-6	ROOF	1	20 A	208/3	DB	
ACCU-7 & ACCU-8	ROOF	2	20 A	208/3	DB	
FCU-1-(1,2,3,5,6,7,8) FCU-2 (1,2,9)	1ST FL 2ND FL	10	0.47 HP	208/1	T	

FCU-1-4, FCU-2-8,FCU-2-10, FCU-2-11	1ST FL 2ND FL	4	0.31 HP	208/1	T	
FCU-1-9, FCU-2-6, FCU-2-7	1ST FL 2ND FL	3	0.40 HP	208/1	T	
FCU-2-4,5	1ST FL	2	0.76 KW	208/1	T	
FCU-C-1,2	CELLAR	2	20 A	208/1	T	
HR-1,2,3,4,5,6	1ST FL 2ND FL	6	0.6 A	208/1	T	
H-A	1ST FL	4	32 KW	208/1	T	
DH-1,4	1ST FL	2	3.4 KW	208/1	T	
DH-2,3	1ST FL	2	2.064 KW	208/1	T	
TF-A	CELLAR	1	0.026 KW	115/1	T	
EF-A	CELLAR	1	0.088 KW	115/1	T	
EF-B	CELLAR	1	0.010 KW	115/1	T	
EF-C	CELLAR	1	0.010 KW	115/1	T	
EH-A	CELLAR	1	12 A	208/1	DB	
EH-B	CELLAR	1	3 KW	208/1	DB	
TH-A	1ST FL	1	1.2 KW	208/1	DB	
CP-A	1st FL	1	0.30 HP	115/1	DB	
DBP-X	CELLAR	1	5 HP	208/3	DB	Duplex Domestic Booster Pump
HWC-X	2ND FLR	1	3/4 HP	120/1	DB	Hot Water Circulation
SEW-1	CELLAR	1	2 HP	208/3	DB	Duplex Sewage Ejector Pumps
SP-1	CELLAR	1	5 HP	208/1	DB	Elevator Sump Pump

SCHEDULE E

Separation of Trades

NOT USED FOR SINGLE CONTRACTS

TABLE OF CONTENTS

CONTRACT #1 - GENERAL CONSTRUCTION WORK

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 013234 - BUILDING INFORMATION MODELLING (BIM) PROTOCOL
SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION
SECTION 015713 - TEMPORARY EROSION AND SEDIMENT CONTROL
SECTION 019119.43 - EXTERIOR ENCLOSURE COMMISSIONING
SECTION 019500 - AS-BUILT BIM MODEL

DIVISION 02 - EXISTING CONDITIONS

SECTION 024119 - SELECTIVE DEMOLITION
SECTION 028013 - INCIDENTAL ASBESTOS ABATEMENT

DIVISION 03 - CONCRETE

SECTION 033000 - CAST-IN-PLACE CONCRETE
SECTION 033543 - POLISHED CONCRETE FINISHING
SECTION 034100 - PRECAST STRUCTURAL CONCRETE

DIVISION 04 - MASONRY

SECTION 040110 - MASONRY CLEANING
SECTION 042000.00 - UNIT MASONRY
SECTION 044200 - EXTERIOR STONEWORK
SECTION 047200 - CAST STONE MASONRY

DIVISION 05 - METALS

SECTION 051200 - STRUCTURAL STEEL FRAMING
SECTION 054000 - COLD-FORMED METAL FRAMING
SECTION 055000 - METAL FABRICATIONS
SECTION 055113 - METAL PAN STAIRS
SECTION 055119 - METAL GRATING STAIRS
SECTION 055213 - PIPE AND TUBE RAILINGS
SECTION 057300 - DECORATIVE METAL RAILINGS
SECTION 057500 - DECORATIVE FORMED METAL

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

SECTION 061000 - ROUGH CARPENTRY
SECTION 061600 - SHEATHING
SECTION 061800 - GLUED-LAMINATED AND CROSS-LAMINATED CONSTRUCTION
SECTION 062023 - INTERIOR FINISH CARPENTRY
SECTION 064113 - WOOD-VENEER-FACED ARCHITECTURAL CABINETS

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING
SECTION 071416 - COLD FLUID-APPLIED WATERPROOFING
SECTION 072100 - THERMAL INSULATION
SECTION 072715 - NONBITUMINOUS SELF-ADHERING SHEET AIR BARRIERS
SECTION 074213.13 - FORMED METAL WALL PANELS
SECTION 074293 - SOFFIT PANELS
SECTION 075600 - COLD LIQUID APPLIED POLYMETHYL METHACRYLATE (PMMA) HYBRID MEMBRANE ROOFING
SECTION 076200 - SHEET METAL FLASHING AND TRIM
SECTION 077100 - ROOF SPECIALTIES
SECTION 077200 - ROOF ACCESSORIES
SECTION 077273 - VEGETATED ROOF SYSTEMS
SECTION 078123 - INTUMESCENT FIRE PROTECTION
SECTION 078413 - PENETRATION FIRESTOPPING
SECTION 078443 - JOINT FIRESTOPPING
SECTION 079100 - PREFORMED JOINT SEALS
SECTION 079200 - JOINT SEALANTS

DIVISION 08 - OPENINGS

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES
SECTION 083113 - ACCESS DOORS AND FRAMES
SECTION 083123 - FLOOR DOORS
SECTION 084213 - ALUMINUM-FRAMED ENTRANCES
SECTION 084413 - GLAZED ALUMINUM CURTAIN WALLS
SECTION 087100 - DOOR HARDWARE
SECTION 088000 - GLAZING
SECTION 088300 - MIRRORS
SECTION 088813 - FIRE-RATED GLAZING
SECTION 088853 - SECURITY GLAZING

DIVISION 09 - FINISHES

SECTION 092116.23 - GYPSUM BOARD SHAFT WALL ASSEMBLIES
SECTION 092216 - NON-STRUCTURAL METAL FRAMING
SECTION 092900 - GYPSUM BOARD
SECTION 093013 - CERAMIC TILING
SECTION 095100 - ACOUSTICAL CEILINGS
SECTION 096466 - WOOD ATHLETIC FLOORING
SECTION 096513 - RESILIENT BASE AND ACCESSORIES
SECTION 096519 - RESILIENT TILE FLOORING
SECTION 096543 - LINOLEUM FLOORING
SECTION 096566 - RESILIENT ATHLETIC FLOORING
SECTION 096813 - TILE CARPETING
SECTION 097200 - WALL COVERINGS
SECTION 097723 - FABRIC-WRAPPED PANELS
SECTION 099123 - INTERIOR PAINTING
SECTION 099611 - HIGH-PERFORMANCE COATINGS

DIVISION 10 - SPECIALTIES

SECTION 101419 - DIMENSIONAL LETTER SIGNAGE
SECTION 101423 - PANEL SIGNAGE
SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS
SECTION 102240 - GLAZED INTERIOR WALL AND DOOR ASSEMBLIES
SECTION 102613 - CORNER GUARDS
SECTION 102813 - TOILET ACCESSORIES
SECTION 104413 - FIRE PROTECTION CABINETS
SECTION 104416 - FIRE EXTINGUISHERS
SECTION 105126 - PLASTIC LOCKERS

DIVISION 11 - EQUIPMENT

SECTION 111136 - VEHICLE CHARGING EQUIPMENT
SECTION 113010 - APPLIANCES
SECTION 116623 - GYMNASIUM EQUIPMENT
SECTION 116653 - GYMNASIUM DIVIDERS

DIVISION 12 - FURNISHINGS

SECTION 122413 - ROLLER WINDOW SHADES
SECTION 123661.19 - QUARTZ AGGLOMERATE COUNTERTOPS
SECTION 124816 - ENTRANCE FLOOR GRILLES
SECTION 126600 - TELESCOPING STANDS

DIVISION 14 - CONVEYING EQUIPMENT

SECTION 142400 - HYDRAULIC ELEVATORS

DIVISION 21 - FIRE SUPPRESSION

SECTION 210500 - COMMON WORK RESULTS FOR FIRE SUPPRESSION
SECTION 210523 - GENERAL-DUTY VALVES FOR WATER-BASED FIRE-SUPPRESSION PIPING
SECTION 210529 - HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT
SECTION 210548 - VIBRATION AND SEISMIC CONTROLS FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT
SECTION 210553 - IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT
SECTION 210800 - COMMISSIONING OF FIRE SUPPRESSION
SECTION 211000 - WATER-BASED FIRE-SUPPRESSION SYSTEMS

DIVISION 22 - PLUMBING

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING
SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING
SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
SECTION 220593 - TESTING, ADJUSTING, AND BALANCING FOR PLUMBING
SECTION 220719 - PLUMBING PIPING INSULATION

SECTION 220800 - COMMISSIONING OF PLUMBING
SECTION 221116 - DOMESTIC WATER PIPING
SECTION 221117 - GRAY-WATER PIPING
SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES
SECTION 221123.13 - DOMESTIC-WATER PACKAGED BOOSTER PUMPS
SECTION 221123.21 - INLINE, DOMESTIC-WATER PUMPS
SECTION 221313 - FACILITY SANITARY SEWERS
SECTION 221316 - SANITARY WASTE AND VENT PIPING
SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES
SECTION 221319.13 - SANITARY DRAINS
SECTION 221329 - SANITARY SEWERAGE PUMPS
SECTION 221414 - STORM DRAINAGE PIPING
SECTION 221423 - STORM DRAINAGE PIPING SPECIALTIES
SECTION 221429 - SUMP PUMPS
SECTION 223300 - ELECTRIC, DOMESTIC-WATER HEATERS
SECTION 224200 - COMMERCIAL PLUMBING FIXTURES
SECTION 224713 - DRINKING FOUNTAINS

DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING(HVAC)

SECTION 230500 - COMMON WORK RESULTS FOR HVAC
SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
SECTION 230548.13 - VIBRATION CONTROLS FOR HVAC
SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC
SECTION 230713 - DUCT INSULATION
SECTION 230719 - HVAC PIPING INSULATION
SECTION 230800 - COMMISSIONING OF HVAC
SECTION 230923 - DIRECT DIGITAL CONTROL (DDC) SYSTEM FOR HVAC
SECTION 230923.12 - CONTROL DAMPERS
SECTION 230923.13 - ENERGY METERS
SECTION 230923.18 - LEAK-DETECTION INSTRUMENTS
SECTION 230993.11 - SEQUENCE OF OPERATIONS FOR HVAC DIRECT DIGITAL CONTROL
SECTION 232123 - HYDRONIC PUMPS
SECTION 232300 - REFRIGERANT PIPING
SECTION 233113 - METAL DUCTS
SECTION 233300 - AIR DUCT ACCESSORIES
SECTION 233416 - CENTRIFUGAL HVAC FANS
SECTION 233423 - HVAC POWER VENTILATORS
SECTION 233600 - AIR TERMINAL UNITS
SECTION 233713.13 - AIR DIFFUSERS
SECTION 233713.23 - AIR REGISTERS AND GRILLES
SECTION 237223.23 - PACKAGED, OUTDOOR, HEAT WHEEL ENERGY RECOVERY UNITS
SECTION 237416.13 - PACKAGED, LARGE-CAPACITY, ROOFTOP AIR-CONDITIONING UNITS
SECTION 237433 - DEDICATED OUTDOOR-AIR UNITS
SECTION 238129 - VARIABLE REFRIGERANT FLOW HVAC SYSTEMS
SECTION 238233 - CONVECTORS
SECTION 238236 - FINNED-TUBE RADIATION HEATERS
SECTION 238239.16 - PROPELLER UNIT HEATERS
SECTION 238239.19 - WALL AND CEILING UNIT HEATERS
SECTION 238413.23 - DIRECT-STEAM-INJECTION HUMIDIFIERS
SECTION 238416.16 - INDOOR, MECHANICAL DEHUMIDIFICATION UNITS

DIVISION 26 - ELECTRICAL

SECTION 260010 - SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL
SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
SECTION 260533.13 - CONDUITS FOR ELECTRICAL SYSTEMS
SECTION 260533.16 - BOXES AND COVERS FOR ELECTRICAL SYSTEMS
SECTION 260553 - IDENTIFICATION OF ELECTRICAL SYSTEMS
SECTION 260800 – COMMISSIONING OF ELECTRICAL SYSTEMS
SECTION 260923 - LIGHTING CONTROL DEVICES
SECTION 262213 - LOW-VOLTAGE DISTRIBUTION TRANSFORMERS
SECTION 262413 - SWITCHBOARDS
SECTION 262416 - PANELBOARDS
SECTION 262713 - ELECTRICITY METERING
SECTION 262716 - ELECTRICAL CABINETS AND ENCLOSURES
SECTION 262726 - WIRING DEVICES
SECTION 262813 - FUSES
SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS
SECTION 263100 - PHOTOVOLTAIC COLLECTORS
SECTION 265000 - LIGHTING
SECTION 265613 - LIGHTING POLES AND STANDARDS

DIVISION 27 - COMMUNICATIONS

SECTION 270010 - SUPPLEMENTAL REQUIREMENTS FOR COMMUNICATIONS
SECTION 270528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS
SECTION 270800 - COMMISSIONING OF COMMUNICATIONS
SECTION 271100 - COMMUNICATIONS EQUIPMENT ROOM FITTINGS
SECTION 271513 - COMMUNICATIONS COPPER HORIZONTAL CABLING

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

SECTION 280010 - SUPPLEMENTAL REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY
SECTION 281000 - ACCESS CONTROL
SECTION 281300 - ACCESS CONTROL SYSTEM SOFTWARE AND DATABASE MANAGEMENT
SECTION 281400 - ACCESS CONTROL SYSTEM HARDWARE
SECTION 281500 - INTEGRATED ACCESS CONTROL HARDWARE DEVICES
SECTION 281513 - ACCESS CONTROL CREDENTIALS
SECTION 281523 - INTERCOM ENTRY SYSTEMS
SECTION 282000 - VIDEO SURVEILLANCE
SECTION 283100 - INTRUSION DETECTION
SECTION 284621.11 - ADDRESSABLE FIRE-ALARM SYSTEMS

DIVISION 31 - EARTHWORK

SECTION 310000 - EARTHWORK
SECTION 310900 - GEOTECHNICAL INSTRUMENTATION AND MONITORING OF EARTHWORK
SECTION 311000 - SITE CLEARING
SECTION 312000 - EARTH MOVING

SECTION 312319 - DEWATERING
SECTION 315000 - EXCAVATION SUPPORT AND PROTECTION
SECTION 316216 - STEEL PILES
SECTION 316800 - FOUNDATION ANCHORS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 321216 - ASPHALT PAVING
SECTION 321313 - CONCRETE PAVING
SECTION 321316 - DECORATIVE CONCRETE PAVING
SECTION 321373 - CONCRETE PAVING JOINT SEALANTS
SECTION 321400 - UNIT PAVING
SECTION 323300 - SITE FURNISHINGS
SECTION 329113 - SOIL PREPARATION
SECTION 329200 - TURF AND GRASSES
SECTION 329300 - PLANTS

DIVISION 33 - UTILITIES

SECTION 331415 - SITE WATER DISTRIBUTION PIPING
SECTION 334200 - STORMWATER CONVEYANCE

END OF SPECIFICATION SECTIONS TABLE OF CONTENTS.
SEE FOLLOWING PAGE FOR APPENDIX.

APPENDIX

01. EXISTING SITE CONDITION REPORTS
GEOTECHNICAL REPORT
PHASE I ENVIRONMENTAL SITE ASSESSMENT
PHASE II ENVIRONMENTAL SUBSURFACE INVESTIGATION REPORT
REMEDIAL ACTION PLAN (RAP)
CONSTRUCTION HEALTH AND SAFETY PLAN (CHASP)

02. STRUCTURAL DOCUMENTS
STRUCTURAL CALCULATIONS PACKAGE

03. MEP DOCUMENTS
CON EDISON LOAD LETTER
ARC FLASH STUDY

04. ACOUSTICAL DOCUMENTS
ACOUSTICAL REPORT

05. SUSTAINABILITY DOCUMENTS
LL 51-2023 COMPLIANCE REPORT
LEED V4 SCORECOARD
LEED BOUNDARY
LEED MATERIAL REPORTING FORM

06. STORMWATER MANAGEMENT DOCUMENTS
SWPPP REPORT

07. SAMPLE GRANT DISBURSEMENT AGREEMENT (GDA) DOCUMENTS
EXHIBIT F: NON-DISCRIMINATION AND AFFIRMATIVE ACTION POLICY FOR THE PROJECT

END OF TABLE OF CONTENTS.

SECTION 01 32 34 – BUILDING INFORMATION MODELLING (BIM) PROTOCOL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract (City of New York Standard Construction Contract).

1.2 SUMMARY

A. The Project must utilize 3D Modeling for the coordination of all Architectural Structural Steel, Mechanical, Plumbing, Fire Protection, Electrical, Low Voltage Systems and Exterior Envelope. The 3D coordination must be based on a coordinated design.

B. This specification covers the intended scope for using BIM for construction purposes. The Contractor will develop a coordinated clash-free Model including Structure, Architecture, and complete MEP services. The Construction Model will be used to generate all Shop Drawings that are directly referencing the Model. The coordinated Construction Model will be used to generate points for automated layout stations which ensure that the installation is accurate and verified. The scope also includes the production of a dimensionally accurate As-Built Model including embedded Facilities Management data.

C. The Contractor agrees to participate in the use of digital/computer based three dimensional models and other related functionality, generally referred to as Building Information Modeling (such models and functionality are referred to herein as BIM) as Commissioner may determine to be beneficial for use in facilitating coordination, sequencing, scheduling and production of as- built depictions of the Project and performance of the Work and as hereafter provided.

D. Contractor agrees that neither the BIM nor the use of the BIM is in lieu of nor intended to relieve the Contractor of its responsibilities under the contract. It is expressly understood and agreed that, notwithstanding the requirement for submittals in connection with the BIM, traditional shop drawings and other submissions will be required of the Contractor as per the Contract Documents.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 01 33 00 “Submittal Procedures”.

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 01 40 00 “Quality Requirements”.

PART 2 - PRODUCTS

2.1 CONTRACTOR SCOPE OF WORK

A. The Contractor will be provided a Design Intent Model consisting of Site Plan, Architecture, Structure and MEP trades in LOD 400 at the outset of construction.

B. The Contractor will be provided the final design model as a base to detach and create their own Construction Model. The Contractor will work collaboratively with the Commissioner to ensure all field conditions are accurately documented in the Construction Model and ensure that they are using the most up to date documents for construction phase coordination.

C. The Contractor may not rely on the accuracy of the Design Intent Model. The Design Intent Model can be used for reference only and all dimensions must be retrieved from the hard copy Drawings and verified by the Contractor.

D. The Contractor's Construction Model must be coordinated with the Design Intent Drawings. Any conflicts with the Models that need to be resolved prior to fabrication and construction must be reported in the form of a Request for Information (RFI). Clash reports may also be issued by the Contractor as background information for RFI's and submittals.

E. The Contractor must include required clearances for maintenance and other access, code clearances and other required clearances. In addition, all modeling to include proposed underground / utilities associated with the project scope to the extent of the property line of the site, in all directions.

F. Clash detection and analysis: Perform clash detection to identify and highlight spatial conflicts within and between the various trades and the building. This can be performed using Navisworks or equivalent application using subcontractor Construction Models, tracking file versions used in each clash analysis.

G. Work collaboratively with subcontractors to recommend potential solutions to conflicts.

H. Indicate where conflict resolution requires modification of design requirements by the Commissioner.

I. Update final construction model to include As-built Models in Revit that includes complete structure, architecture Models to LOD 500. MEP equipment and accessories that require FM attribute will be modeled to LOD 500. The Models will be populated with Facilities data using parameters provided by the Commissioner. Any ducts and pipes generated using CAD based authoring software will be linked in as reference to the Revit Model.

J. The Contractor must provide the Commissioner with all the necessary access to review the documents and interface with Contractor's team. Coordination meetings as per the coordination schedule will occur between the Commissioner to ensure the correct development of the Construction Model.

K. The Contractor will insert relevant building element data as listed below in the As-Built Model. The data may also be provided to the Commissioner as a separate spreadsheet. The Commissioner to determine the Building Element Data as well as attributes for all MEP assets:
   1. Asset name
   2. Room name

3. Room number
4. Manufacturer
5. Model Number
6. Serial Number
7. Installation Date
8. Bar Code (if any)
9. Submittal Number
10. Link to O&M
11. System Served

L. Utilize the Construction Model to generate layout points for automated layout stations so the installation can be laid out and verified to ensure proper positioning per the coordinated Construction Model.

M. Allow real time access to the Construction Model.
1. BIM applications to be utilized for all BIM model submissions and deliverables. Subject to compliance with requirements, provide one of the following:
   a. Autodesk Revit 2024
   b. Bentley MicroStation
   c. AllPlan Nemetschek
   d. BIM 360
   e. Or approved equal
2. Construction Model files for Coordination.
3. During the coordination phase weekly publish all clash reports and current versions of all Coordination Models, with clash views, in .nwd format to the collaboration website.

2.2 CONSTRUCTION MODEL BIM COORDINATOR

A. The Contractor must identify an individual assigned to be the Construction Model BIM Coordinator. This individual must have the appropriate level of relevant BIM experience required for the project complexity and acquisition delivery strategy. In general, responsibilities should include the following:
1. Overall responsibility for the Construction Model creation and information developed during construction.
2. Coordinates software and establishes protocol software for Construction Team for efficient delivery of project.
3. Acts as the main point of contact for BIM and related issues between the Contractor's Team, subcontractors, the Commissioner, the City of New York, and others as required.
4. Ensures that all personnel have the necessary hardware and software installed and accessible for project use.
5. Coordinates construction sequencing and scheduling activities, and assures they are integrated with the Construction BIM.
6. Facilitates use of composite trade models, provided by subcontractors, in construction coordination/clash detection meetings and provides detection reports by the identification and resolution of all hard and soft collisions.
7. Communicates with the Commissioner, coordinates the data extraction sets required by the construction trades and ensures that these requests are met.

8. Coordinates with the Commissioner to facilitate that design changes in the field have been documented and are updated in the Construction Model in a timely manner. Provides design team with hard copies of changes made in the field for future reference in confirming the as-built model.
9. Prior to approval and installation, works with their lead Fabrication Modelers to integrate 3D fabrication models with the Construction Model to ensure compliance with design intent.

2.3 CONSTRUCTION PHASE BIM PLAN

A. The Contractor must develop a Construction Phase BIM Plan: Within 21 calendar days of Notice to Proceed, the Contractor must submit, for Commissioner's Representatives review and approval, a Construction BIM Plan. The BIM Plan must include at the minimum:
1. General Requirements of Subcontractors
2. Model Partitioning
3. Common Coordinate System and Units
4. File Naming and Versioning
5. List of Construction Models to be developed
6. Plan for achieving an LOD-500 in the Construction Models
7. Organization Responsible for Each Construction Model
8. Software and Version to be Used to Develop Each Construction Model
9. Any Required Object Enablers
10. Name and Contact Information for Each Organization's BIM Coordinator
11. Coordination /Clash Detection Process
12. Coordination /Clash Detection Schedule
13. Clashes to be Run (e.g.: HVAC vs. Structure)
14. Any Other Applications of the Construction Models (e.g.: 4D)
15. Plan for achieving an LOD-500 As-Built Models and asset data
16. Methodology for preparing the As-Built BIM Deliverables to the City of New York

2.4 ACCEPTABLE CONSTRUCTION MODELING FORMATS

A. All software proposed for model authoring and coordination must be submitted for approval by the Commissioner.

B. All Software used must be Version 2024 or above unless otherwise approved by the Commissioner.

C. Software: Subject to compliance with requirements, provide one of the following:
1. Authoring
   a. Architecture:
      1) Autodesk Revit 2024
      2) Bentley MicroStation
      3) AllPlan Nemetschek
      4) Or Approved Equal
   b. Structure:
      1) Autodesk Revit 2024
      2) Tekla Structures
      3) Bentley MicroStation

4) Or Approved Equal

c. MEP Discipline Model:
1) Autodesk Revit 2024
2) Trade 3D CAD
3) Bentley MicroStation
4) Or Approved Equal

2. Coordination
a. Coordination Model:
1) Autodesk Navisworks 2024
2) Bentley Navigator
3) BIM 360 Glue
4) Or Approved Equal

b. As-Built Model:
1) Autodesk Revit 2024
2) AutoCAD MEP
3) Bentley Navigator
4) Or Approved Equal

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 BIM KICKOFF MEETING

A. The Commissioner will schedule and conduct a BIM Kickoff Meeting. BIM Modeling work by the Contractor and its subcontractors must not commence prior to the BIM Kickoff Meeting. The Meeting will review BIM requirements, standards and responsibilities.

B. Attendees: Participants in the BIM Kickoff Meeting must be familiar with the project and must be authorized to conclude matters relating to the BIM work. At a minimum include representatives of the following parties or their designated representatives:
1. Commissioner
2. Construction Manager
3. Construction Manager's BIM Coordinator
4. Contractor's Project Manager
5. Contractor's BIM Coordinator
6. BIM Coordinators of all subcontractors producing Construction BIMs
7. Project Coordinators of all subcontractors producing Construction BIMs

C. Agenda: Subjects for discussion will include items significant to the effective use of BIM coordination techniques and correct production of Construction BIM, including but not limited to the following:
1. BIM expectations and project goals
2. Coordination process

3. Review of BIM Plan, including Model contents and standards
4. Requirement to deliver equipment data in electronic format
5. Final BIM deliverables by the Contractor.

D. Reporting: The Commissioner will distribute minutes of the meeting to each party present and to other concerned parties.

3.3 TRADE COORDINATION

A. The Contractor is required to utilize 3D Fabrication Modeling Software for all shop drawings and submittals (only submittals that will develop shop drawings are required to utilize 3D modeling or as directed by the Commissioner). The Contractor is required to fully integrate the various BIM/3D shop drawings and submittals into Construction Model; perform full clash detection on the results of the integration. The Commissioner will not be responsible for integrating shop drawings or submittals into Design Intent Model nor the Construction Model.

B. Each Subcontractor is required to have access to the BIM software. The software is required to compile the multiple model drawings, and for the subcontractor to run their own clash detection analysis. It is also required that the coordination representative for each trade must be equipped with a laptop and a associated license with which to attend coordination meetings. This subcontractor coordination representative must be authorized and prepared to make live, real-time changes to the "Shop Model" in these coordination meetings, in order to review the finalized, signed off coordinated models prior to and during the fabrication/installation process.

C. Each Trade is required to review the clash detection report generated by the BIM Coordinator prior to each coordination meeting and attend each meeting prepared to address the unresolved clashes in a constructive manner.

D. Each Trade is required to collaborate with each other trades through e-mail, telephone, and in person, to resolve basic clashes outside of the Coordination meetings. Contractor to coordinate with Commissioner daily/weekly Coordination meetings are held to address work. At these meetings the resolution will be collectively agreed upon. This trade will adjust its respective model and repost it with enough time for other subcontractors to review prior to the upcoming meeting. All the remaining trades are responsible to update and post the changes agreed upon at the coordination meeting within 1 week or as directed by Commissioner.

E. The Commissioner will review the progress of the Construction Model by the Contractor on a weekly basis to help assure that the Construction Model is maintained current throughout construction. Updates to the construction model must include all RFI's, Change Orders, Bulletins, Commissioner's field staff reports, approved submittals, and other field reports. The Contractor must retain responsibility for inspection and measurement.

F. The Commissioner will participate in 2D/3D-based submittal reviews and coordination work sessions. The Commissioner will work collaboratively with the Contractor who will turn over an As-Built Model for all building systems at construction completion which incorporates any contract design changes that impact the original design intent model and field conditions.

G. Approved programs will be used for model management. All clash reports and Coordination Models will be uploaded to the collaboration website.

H. There will be no compensation for improperly coordinated or uncoordinated installations; such work will be removed and replaced at the Contractor's expense.

3.4 CONTRACTOR SUBMISSION AND DELIVERABLES

A. It is the Contractor's responsibility to provide real time access to the Construction Model to Commissioner.

B. At the end of construction, the following deliverables must be provided to the City
   1. All Discipline/Trade As-built models in editable format.
   2. Composite summary format.
   3. Facility asset data provided either in the model as element parameters or provided as a separate spreadsheet
   4. Final As-Built PDF for each floor and each trade with proper annotations
   5. Final As-Built DWG for each floor and each trade with proper annotations
   6. Final Civil 2D/3D Model and PDF depicting all Utilities

C. The Contractor is required to submit 3 copies of hard drives containing all the above deliverables.

END OF SECTION 01 32 34

SECTION 01 32 34 – BUILDING INFORMATION MODELING (BIM) PROTOCOL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract (City of New York Standard Construction Contract).

1.2 SUMMARY

A. The Project must utilize 3D Modeling for the coordination of all Architectural Structural Steel, Mechanical, Plumbing, Fire Protection, Electrical, Low Voltage Systems and Exterior Envelope. The 3D coordination must be based on a coordinated design.

B. This specification covers the intended scope for using BIM for construction purposes. The Contractor will develop a coordinated clash-free Model including Structure, Architecture, and complete MEP services. The Construction Model will be used to generate all Shop Drawings that are directly referencing the Model. The coordinated Construction Model will be used to generate points for automated layout stations which ensure that the installation is accurate and verified. The scope also includes the production of a dimensionally accurate As-Built Model including embedded Facilities Management data.

C. The Contractor agrees to participate in the use of digital/computer based three dimensional models and other related functionality, generally referred to as Building Information Modeling (such models and functionality are referred to herein as BIM) as Commissioner may determine to be beneficial for use in facilitating coordination, sequencing, scheduling and production of as- built depictions of the Project and performance of the Work and as hereafter provided.

D. Contractor agrees that neither the BIM nor the use of the BIM is in lieu of nor intended to relieve the Contractor of its responsibilities under the contract. It is expressly understood and agreed that, notwithstanding the requirement for submittals in connection with the BIM, traditional shop drawings and other submissions will be required of the Contractor as per the Contract Documents.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 01 33 00 “Submittal Procedures”.

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 01 40 00 “Quality Requirements”.

PART 2 - PRODUCTS

2.1 CONTRACTOR SCOPE OF WORK

A. The Contractor will be provided a Design Intent Model consisting of Site Plan, Architecture, Structure and MEP trades in LOD 400 at the outset of construction.

B. The Contractor will be provided the final design model as a base to detach and create their own Construction Model. The Contractor will work collaboratively with the Commissioner to ensure all field conditions are accurately documented in the Construction Model and ensure that they are using the most up to date documents for construction phase coordination.

C. The Contractor may not rely on the accuracy of the Design Intent Model. The Design Intent Model can be used for reference only and all dimensions must be retrieved from the hard copy Drawings and verified by the Contractor.

D. The Contractor's Construction Model must be coordinated with the Design Intent Drawings. Any conflicts with the Models that need to be resolved prior to fabrication and construction must be reported in the form of a Request for Information (RFI). Clash reports may also be issued by the Contractor as background information for RFI's and submittals.

E. The Contractor must include required clearances for maintenance and other access, code clearances and other required clearances. In addition, all modeling to include proposed underground / utilities associated with the project scope to the extent of the property line of the site, in all directions.

F. Clash detection and analysis: Perform clash detection to identify and highlight spatial conflicts within and between the various trades and the building. This can be performed using Navisworks or equivalent application using subcontractor Construction Models, tracking file versions used in each clash analysis.

G. Work collaboratively with subcontractors to recommend potential solutions to conflicts.

H. Indicate where conflict resolution requires modification of design requirements by the Commissioner.

I. Update final construction model to include As-built Models in Revit that includes complete structure, architecture Models to LOD 500. MEP equipment and accessories that require FM attribute will be modeled to LOD 500. The Models will be populated with Facilities data using parameters provided by the Commissioner. Any ducts and pipes generated using CAD based authoring software will be linked in as reference to the Revit Model.

J. The Contractor must provide the Commissioner with all the necessary access to review the documents and interface with Contractor's team. Coordination meetings as per the coordination schedule will occur between the Commissioner to ensure the correct development of the Construction Model.

K. The Contractor will insert relevant building element data as listed below in the As-Built Model. The data may also be provided to the Commissioner as a separate spreadsheet. The Commissioner to determine the Building Element Data as well as attributes for all MEP assets:
   1. Asset name
   2. Room name

3. Room number
4. Manufacturer
5. Model Number
6. Serial Number
7. Installation Date
8. Bar Code (if any)
9. Submittal Number
10. Link to O&M
11. System Served

L. Utilize the Construction Model to generate layout points for automated layout stations so the installation can be laid out and verified to ensure proper positioning per the coordinated Construction Model.

M. Allow real time access to the Construction Model.
1. BIM applications to be utilized for all BIM model submissions and deliverables. Subject to compliance with requirements, provide one of the following:
   a. Autodesk Revit 2024
   b. Bentley MicroStation
   c. AllPlan Nemetschek
   d. BIM 360
   e. Or approved equal
2. Construction Model files for Coordination.
3. During the coordination phase weekly publish all clash reports and current versions of all Coordination Models, with clash views, in .nwd format to the collaboration website.

2.2 CONSTRUCTION MODEL BIM COORDINATOR

A. The Contractor must identify an individual assigned to be the Construction Model BIM Coordinator. This individual must have the appropriate level of relevant BIM experience required for the project complexity and acquisition delivery strategy. In general, responsibilities should include the following:
1. Overall responsibility for the Construction Model creation and information developed during construction.
2. Coordinates software and establishes protocol software for Construction Team for efficient delivery of project.
3. Acts as the main point of contact for BIM and related issues between the Contractor's Team, subcontractors, the Commissioner, the City of New York, and others as required.
4. Ensures that all personnel have the necessary hardware and software installed and accessible for project use.
5. Coordinates construction sequencing and scheduling activities, and assures they are integrated with the Construction BIM.
6. Facilitates use of composite trade models, provided by subcontractors, in construction coordination/clash detection meetings and provides detection reports by the identification and resolution of all hard and soft collisions.
7. Communicates with the Commissioner, coordinates the data extraction sets required by the construction trades and ensures that these requests are met.

8. Coordinates with the Commissioner to facilitate that design changes in the field have been documented and are updated in the Construction Model in a timely manner. Provides design team with hard copies of changes made in the field for future reference in confirming the as-built model.
9. Prior to approval and installation, works with their lead Fabrication Modelers to integrate 3D fabrication models with the Construction Model to ensure compliance with design intent.

2.3 CONSTRUCTION PHASE BIM PLAN

A. The Contractor must develop a Construction Phase BIM Plan: Within 21 calendar days of Notice to Proceed, the Contractor must submit, for Commissioner's Representatives review and approval, a Construction BIM Plan. The BIM Plan must include at the minimum:
1. General Requirements of Subcontractors
2. Model Partitioning
3. Common Coordinate System and Units
4. File Naming and Versioning
5. List of Construction Models to be developed
6. Plan for achieving an LOD-500 in the Construction Models
7. Organization Responsible for Each Construction Model
8. Software and Version to be Used to Develop Each Construction Model
9. Any Required Object Enablers
10. Name and Contact Information for Each Organization's BIM Coordinator
11. Coordination /Clash Detection Process
12. Coordination /Clash Detection Schedule
13. Clashes to be Run (e.g.: HVAC vs. Structure)
14. Any Other Applications of the Construction Models (e.g.: 4D)
15. Plan for achieving an LOD-500 As-Built Models and asset data
16. Methodology for preparing the As-Built BIM Deliverables to the City of New York

2.4 ACCEPTABLE CONSTRUCTION MODELING FORMATS

A. All software proposed for model authoring and coordination must be submitted for approval by the Commissioner.

B. All Software used must be Version 2024 or above unless otherwise approved by the Commissioner.

C. Software: Subject to compliance with requirements, provide one of the following:
1. Authoring
   a. Architecture:
      1) Autodesk Revit 2024
      2) Bentley MicroStation
      3) AllPlan Nemetschek
      4) Or Approved Equal
   b. Structure:
      1) Autodesk Revit 2024
      2) Tekla Structures
      3) Bentley MicroStation

4) Or Approved Equal

c. MEP Discipline Model:
1) Autodesk Revit 2024
2) Trade 3D CAD
3) Bentley MicroStation
4) Or Approved Equal

2. Coordination
a. Coordination Model:
1) Autodesk Navisworks 2024
2) Bentley Navigator
3) BIM 360 Glue
4) Or Approved Equal

b. As-Built Model:
1) Autodesk Revit 2024
2) AutoCAD MEP
3) Bentley Navigator
4) Or Approved Equal

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 BIM KICKOFF MEETING

A. The Commissioner will schedule and conduct a BIM Kickoff Meeting. BIM Modeling work by the Contractor and its subcontractors must not commence prior to the BIM Kickoff Meeting. The Meeting will review BIM requirements, standards and responsibilities.

B. Attendees: Participants in the BIM Kickoff Meeting must be familiar with the project and must be authorized to conclude matters relating to the BIM work. At a minimum include representatives of the following parties or their designated representatives:
1. Commissioner
2. Construction Manager
3. Construction Manager's BIM Coordinator
4. Contractor's Project Manager
5. Contractor's BIM Coordinator
6. BIM Coordinators of all subcontractors producing Construction BIMs
7. Project Coordinators of all subcontractors producing Construction BIMs

C. Agenda: Subjects for discussion will include items significant to the effective use of BIM coordination techniques and correct production of Construction BIM, including but not limited to the following:
1. BIM expectations and project goals
2. Coordination process

3. Review of BIM Plan, including Model contents and standards
4. Requirement to deliver equipment data in electronic format
5. Final BIM deliverables by the Contractor.

D. Reporting: The Commissioner will distribute minutes of the meeting to each party present and to other concerned parties.

3.3 TRADE COORDINATION

A. The Contractor is required to utilize 3D Fabrication Modeling Software for all shop drawings and submittals (only submittals that will develop shop drawings are required to utilize 3D modeling or as directed by the Commissioner). The Contractor is required to fully integrate the various BIM/3D shop drawings and submittals into Construction Model; perform full clash detection on the results of the integration. The Commissioner will not be responsible for integrating shop drawings or submittals into Design Intent Model nor the Construction Model.

B. Each Subcontractor is required to have access to the BIM software. The software is required to compile the multiple model drawings, and for the subcontractor to run their own clash detection analysis. It is also required that the coordination representative for each trade must be equipped with a laptop and a associated license with which to attend coordination meetings. This subcontractor coordination representative must be authorized and prepared to make live, real-time changes to the "Shop Model" in these coordination meetings, in order to review the finalized, signed off coordinated models prior to and during the fabrication/installation process.

C. Each Trade is required to review the clash detection report generated by the BIM Coordinator prior to each coordination meeting and attend each meeting prepared to address the unresolved clashes in a constructive manner.

D. Each Trade is required to collaborate with each other trades through e-mail, telephone, and in person, to resolve basic clashes outside of the Coordination meetings. Contractor to coordinate with Commissioner daily/weekly Coordination meetings are held to address work. At these meetings the resolution will be collectively agreed upon. This trade will adjust its respective model and repost it with enough time for other subcontractors to review prior to the upcoming meeting. All the remaining trades are responsible to update and post the changes agreed upon at the coordination meeting within 1 week or as directed by Commissioner.

E. The Commissioner will review the progress of the Construction Model by the Contractor on a weekly basis to help assure that the Construction Model is maintained current throughout construction. Updates to the construction model must include all RFI's, Change Orders, Bulletins, Commissioner's field staff reports, approved submittals, and other field reports. The Contractor must retain responsibility for inspection and measurement.

F. The Commissioner will participate in 2D/3D-based submittal reviews and coordination work sessions. The Commissioner will work collaboratively with the Contractor who will turn over an As-Built Model for all building systems at construction completion which incorporates any contract design changes that impact the original design intent model and field conditions.

G. Approved programs will be used for model management. All clash reports and Coordination Models will be uploaded to the collaboration website.

H. There will be no compensation for improperly coordinated or uncoordinated installations; such work will be removed and replaced at the Contractor's expense.

3.4 CONTRACTOR SUBMISSION AND DELIVERABLES

A. It is the Contractor's responsibility to provide real time access to the Construction Model to Commissioner.

B. At the end of construction, the following deliverables must be provided to the City
1. All Discipline/Trade As-built models in editable format.
2. Composite summary format.
3. Facility asset data provided either in the model as element parameters or provided as a separate spreadsheet
4. Final As-Built PDF for each floor and each trade with proper annotations
5. Final As-Built DWG for each floor and each trade with proper annotations
6. Final Civil 2D/3D Model and PDF depicting all Utilities

C. The Contractor is required to submit 3 copies of hard drives containing all the above deliverables.

END OF SECTION 01 32 34

SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. The Work of this Section Includes: General protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. Related Requirements:

1. DDC General Conditions Section 015000 "Temporary Facilities Services, and Controls" for temporary controls, utilities, support facilities, and temporary site fencing.
2. Section 311000 "Site Clearing" for removing existing trees and shrubs and for temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

A. Caliper: Diameter of a trunk measured by a diameter tape or the average of the smallest and largest diameters at a height 6 inches above the ground for trees up to and including 4-inch size at this height and as measured at a height of 12 inches above the ground for trees larger than 4-inch size.

B. Caliper (DBH): Diameter breast height; diameter of a trunk as measured by a diameter tape or the average of the smallest and largest diameters at a height 54 inches above the ground line for trees with caliper of 8 inches or greater as measured at a height of 12 inches above the ground.

C. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:

a. Tree-service firm's resources and equipment needed to make progress and avoid delays.
b. Arborist's responsibilities.
c. Quality-control program.
d. Coordination of Work and equipment movement with the locations of protection zones.
e. Trenching by hand or with air spade within protection zones.
f. Field quality control.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data:

1. General protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. Shop Drawings:

1. Include plans, elevations, and sections showing trees and plants to be protected, locations of protection-zone fencing and signage, and the relationship between equipment-movement routes and material storage locations with protection zones.
2. Detail fabrication and assembly of protection-zone fencing and signage.
3. Indicate extent of utility boring and trenching by hand or with air spade within protection zones.
4. Include existing irrigation system that will be used to water plants, if applicable.

C. Samples: For each type of the following:

1. Organic Mulch: 1-quart volume of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
2. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.
3. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.

D. Tree-Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1. Species and size of tree.
2. Location on site plan. Include unique identifier for each.
3. Reason for pruning.
4. Description of pruning to be performed.
5. Description of maintenance following pruning.

E. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

F. Mitigation Requirements: As required by the NYC Department of Parks and Recreation- Division of Forestry or developed by arborist, for mitigation of damage to trees and other plantings. Include the following:

1. Standards established under the approved tree mitigation report developed by the arborist.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For arborist and tree service firm.

B. Certification: From arborist, certifying that trees indicated to remain have been protected during construction in accordance with recognized standards and that trees were promptly and properly treated and repaired when damaged.

C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

D. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1. Use sufficiently detailed photographs or video recordings.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

E. Quality-control program.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Arborist Qualifications: Certified Arborist as certified by ISA or Certified Arborist-Municipal Specialist as certified by ISA and retained by the Contractor.

C. Tree-Service Firm Qualifications: An experienced tree-service firm that has successfully completed temporary tree- and plant-protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

D. Quality-Control Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work without damaging trees and plantings. Include dimensioned diagrams for placement of protection-zone fencing and signage, the arborist's and tree-service firm's responsibilities, instructions given to workers on the use and care of protection zones, and enforcement of requirements for protection zones.

1.9 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Moving or parking vehicles or equipment.

3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

D. Take precautions to protect plants from airborne contaminants, such as paint or fireproofing overspray.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Soil: Stockpiled soil from location indicated on Drawings, Stockpiled soil mixed with planting soil or Planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

1. Mixture: Well-blended mix of 2 parts stockpiled soil to 1 part planting soil.
2. Planting Soil: Planting soil as specified in Section 329113 "Soil Preparation".

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Shredded hardwood, ground or shredded bark, or wood and bark chips as directed by the Arboirst for each individual tree species.
2. Size Range: 3 inches maximum, 1/2 inch minimum.
3. Color: Natural.

C. Protection-Zone Fencing: Fencing fixed in position and meeting one of the following requirements: Previously used materials may be used when approved by Commissioner.

1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch opening, 0.148-inch- diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- OD line posts, and 2-7/8-inch- OD corner and pull posts; with 1-5/8-inch- OD top rails; or with 0.177-inch-diameter top tension wire and 0.177-inch- diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.

   a. Height: 48 inches.
   b. Polymer-Coating Color: As selected by the Commissioner.

2. Wood Protection-Zone Fencing: Constructed of two 2-by-4-inch horizontal rails, with 2-by-4-inch preservative-treated wood posts spaced not more than 96 inches apart, and lower rail set halfway between top rail and ground.

   a. Height: As indicated on the Drawings.

b. Lumber: Comply with requirements in Section 061000 "Rough Carpentry."

3. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and weighing a minimum of 0.4 lb/ft.; remaining flexible from minus 60 to plus 200 deg F; inert to most chemicals and acids; minimum tensile yield strength of 2000 psi and ultimate tensile strength of 2680 psi; secured with plastic bands or galvanized-steel or stainless steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 96 inches apart.

   a. Height: 54 inches.
   b. Color: High-visibility orange, nonfading.

4. Gates: Single- or Double swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width as indicated on the Drawings.

D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering and as follows:

1. Size and Text: As indicated on Drawings.
2. Lettering: 3-inch- high minimum, black characters on white background.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion and sedimentation control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. Prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.3 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Flag or tie a 1-inch blue vinyl tape around each tree trunk at 54 inches above the ground.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.4 TREE PROTECTION

A. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated. Do not exceed indicated thickness of mulch.

1. Apply 2-inch or 4-inch uniform thickness of organic mulch unless otherwise indicated or directed by the Arborist. Do not place mulch within 6 inches of tree trunks.
2. Install temporary root-protection matting over mulch to the extent indicated.

B. Trunk Protection: Protect the trunk of each tree to remain as follows:

1. Wrap trunk with orange plastic construction fencing to 2 inches in thickness or minimum 1/4-inch closed-cell foam pads. Install wood planks, around trunk over wrap at maximum 3 inches apart. Minimum three planks per tree. Band together with no less than three steel bands stapled to the planks to hold them securely in place.

   a. Height: Minimum 48 inches.
   b. Trunk protection to remain in place no longer than six months. If construction exceeds timeframe indicated, inspect trunk protection at six-month intervals and loosen if necessary.

3.5 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people and animals from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

1. Chain-Link Fencing: Install to comply with ASTM F567 and with manufacturer's written instructions.
2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Commissioner.
3. Access Gates: Install where indicated; adjust to operate smoothly, easily, and quietly; free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
4. Plastic Fencing: Stretch fabric taut and secure to posts without bows or sags.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Commissioner. Install one sign spaced approximately every 20 ft. on protection-zone fencing, but no fewer than four signs with each facing a different direction.

C. Maintain protection zones free of weeds and trash.

D. Maintain hydration of plants to assure plant survival.

E. Maintain protection-zone fencing and signage in good condition as acceptable to Commissioner and remove when construction operations are complete and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.6 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones in accordance with requirements in Section 312000 "Earth Moving" unless otherwise indicated.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.

3.7 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as directed by the Arborist, and as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Cut Ends: Do not paint cut root ends.
3. Temporarily support and protect roots from damage until they are permanently covered with soil.
4. Cover exposed roots with burlap and water regularly.
5. Backfill as soon as possible in accordance with requirements in Section 312000 "Earth Moving."

B. Root Pruning at Edge of Protection Zone: Prune tree roots in length directed by the Arborist outside, inside, or flush with the edge of the protection zone by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.8 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.

1. Prune to remove only injured**,** broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
3. Pruning Standards: Prune trees in accordance with ANSI A300 and as indicated on Drawings.

   a. Type of Pruning: Cleaning, raising, reducing and thinning where indicated.
   b. Specialty Pruning: restoration, vista, espalier, pollarding, palm, and utility where indicated.

B. Unless otherwise directed by arborist and acceptable to Commissioner, do not cut tree leaders.

C. Cut branches with sharp pruning instruments; do not break or chop.

D. Do not paint or apply sealants to wounds.

E. Provide subsequent pruning during Contract period as recommended by arborist.

F. Chip removed branches and dispose of off-site.

3.9 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.

1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

D. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.10 FIELD QUALITY CONTROL

A. Inspections: Arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.11 CORRECTIVE WORK AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Commissioner.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours in accordance with arborist's written instructions.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Commissioner.

B. Trees: Consult with arborist for trees to remain, be removed, or be replaced.

1. Plant and maintain new trees as specified in Section 329300 "Plants."

C. Soil Aeration: Where directed by Commissioner, aerate surface soil compacted during construction. Aerate 10 ft. beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch- diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

END OF SECTION 015639

SECTION 015713 - TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. This Section includes:

1. Installation, Maintenance, and Removal of Temporary Silt Fence
2. Temporary Wooden Tree Guard

B. Contractor must implement practices and procedures to meet the project's environmental performance goals.

C. Related Requirements:

1. Section 312000, Earth moving
2. Section 015639, Temporary Tree and Plant Protection
3. Section 311000, Site Clearing

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Under this item, the Contractor must install Temporary Silt Fence to prevent excess sediment from leaving the site, at the locations shown on the plans in accordance with the specifications and as directed by the Commissioner.

B. The intent of this item is to facilitate an erosion and sediment control plan, which may be required by the NYS Department of Environmental Conservation (DEC) in accordance with the State Pollutant Discharge Elimination System (SPDES) and The Code of Federal Regulations, 40 CFR Part 122.

C. Sustainable Design Submittals: Refer to Section 01 81 13.04, "Sustainable Design Requirements For LEED v4 Buildings."

1. LEED reporting submittals must include complete "LEEDv4 Product Data Submittal Reporting Form" with back-up documentation as indicated on the form.

a. Incomplete or inaccurate LEED Product Data submittals may be used as the basis for rejecting submitted products or assemblies.

2. Submittals include but are not limited to the following:

a. Laboratory Test Reports: For composite wood products, indication compliance with requirements for low-emitting materials.
b. Product Data: For installation adhesives, indication VOC content.
c. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 SILT FENCES

A. Post:

1. Posts must be wood, steel, or an approved synthetic material, with a minimum length of three (3') feet. Hardwood posts must have a minimum cross-sectional area of 1.25" x 1.25" and steel posts of U, T, L, or C shape must weigh one (1. lb) pound per linear foot.

B. Wire Mesh

1. Wire mesh fencing must be a minimum of fourteen (14) gauge with a maximum six (6") inch mesh opening.

C. Geotextile

1. Fibers used in the manufacture of geotextiles, and the threads used in joining geotextiles by sewing, must consist of long-chain, synthetic polymers, composed of at least 95 percent by weight polyolefins, polyesters, or polyamides. The geotextile and the threads used in sewing geotextiles, must be resistant to chemical attack, rot, and mildew. The geotextile must have no tears or defects which adversely alter its physical properties. They must be formed into a stable network such that the filaments or yarns retain their dimensional stability relative to each other, including selvages. The geotextile must have no tears or defects which adversely alter its physical properties.

2.2 TEMPORARY WOOD TREE GUARD

A. Tree Guard:

1. Lumber must be Yellow Pine, Douglas Fir or Spruce of the dimensions shown on plans. Nails must be galvanized. No paint will be required. All work must be done in a neat and workmanlike manner to the satisfaction of the Commissioner.

B. High Density Polyethylene (HDPE) mesh:

1. Color to be orange.

C. Line Post/Stake:

1. Line post/Stake must be No. 4 rebar.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 SILT FENCE

A. Installation

1. Silt fence must be installed prior to land disturbing activities or as necessary to control erosion from land disturbing activities. Comply with all applicable standards for Soil Erosion and Sediment Control as set forth by New York State DEC. Care must be taken when installing the silt fence that all the requirements of Section 015639 - Temporary Tree and Plant Protection must be followed. In addition, where tree roots of one (1") inch or greater are encountered, or if directed by the Commissioner, the Contractor must move the location of the silt fence to avoid damage to the existing trees.
2. Contractor must first excavate a trench approximately six (6") inches deep and four (4") inches wide in the line of the silt fence. Silt fence to be located at least ten feet from the toes of steep slopes and nearly level throughout its length. The contractor must drive posts securely at least sixteen (16") inches into the ground on the done slip side of the trench. Post spacing must be eight (8') feet apart. O.C. maximum. Adjust spacing to place posts at low points along fence line.
3. Fasten support wire fence to upslope side of posts, extending six inches into the trench. Attach continuous length of fabric to upslope side of fence posts with ties spaced every twenty-four (24") inches at tip and mid-section. Avoid joints, particularly at low points in the fence line. Where joints are necessary, fasten fabric securely to support posts and overlap to the next post. Place the fabric in the trench so the bottom folds across the bottom of the trench. Place backfill in the trench over the fabric to the ground line and compact with a power tamper.
4. Additional erosion and sedimentation control measures beyond those shown on the drawings may be required to prevent siltation. The Commissioner must determine the necessity of actual measures beyond those installed by the contractor.

B. Maintenance And Removal:

1. Contractor must inspect silt fences every seven (7) days and after each rainfall event. Any sediment deposits found must be removed promptly to provide adequate storage volume for the next rain and reduce pressure on the fence. Take care not to undermine the silt fence during cleanout. If the fabric is torn, decomposed, or in anyway becomes ineffective, the Contractor must replace it immediately without additional cost.

2. The silt fence must remain in place and be maintained until the completion of the work or as directed by the Commissioner and must become the property of the Contractor. Upon removal, the Contractor must remove and dispose of any excess sediment accumulations.

3.3 TEMPORARY WOODEN TREE GUARD

A. Installation:

1. The temporary wooden tree guards must be installed where shown on the contract drawings. Posts must be installed at approximately eight feet on center, unless otherwise noted on the plans or directed by the Commissioner. They must be installed with line post/stakes securely attached with No. 4 rebar attached with galvanized wire to the wooden posts and driven a minimum of two (2') feet into the ground, or as directed by the Commissioner, without damage to existing trees. If any temporary wooden tree guards are damaged during the course of the work, they must be immediately repaired, or replaced by a new temporary wooden tree guard at no additional expense.
2. HDPE mesh must be attached to outside of tree guard, straight and taut, with no stretching or sagging, and secured using galvanized wire or staples, Work is to be done in a neat and workmanlike manner. All extra mesh must be trimmed or properly secured.
3. Temporary wooden tree guards must remain in place and not be moved or removed without written permission of the Commissioner or their designated representative until all work which might cause damage or defacement has been completed. Upon completion of the work, to the satisfaction of the Commissioner, the Contractor must remove and dispose of all temporary wooden tree guards.

END OF SECTION 015713

SECTION 019119.43 - EXTERIOR ENCLOSURE COMMISSIONING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract (City of New York Standard Construction Contract).

B. This section will in no way diminish the responsibility of any Divisions, especially 03, 04, 06, 07, and 08, Subcontractors and Suppliers in performing all aspects of work as outlined in the contract documents. Any requirements outlined in this section are in addition to requirements outlined in Division 03, 04, 06, 07, and 08.

1.2 SUMMARY

A. Section includes building enclosure Cx process requirements for the above- and below-grade systems and assemblies:

1. Horizontal and vertical waterproofing.
2. Opaque walls.
3. Roofs.
4. Fenestrations/Glazing.
5. Interfaces.

B. Related Requirements:

1. DDC General Conditions Section 019113 "General Commissioning Requirements for MEP" for Cx team membership, City of New York's responsibilities, Contractor's responsibilities, and BECA's responsibilities.
2. DDC General Conditions Section 019115 "General Commissioning Requirements for Building Enclosures" for Cx team membership, City of New York's responsibilities, Contractor's responsibilities, and BECA's responsibilities.
3. Division 03, 05, 07, 08 and 09 specification sections also apply to this section. Where conflicts arise regarding building enclosure testing, requirements in this section supersede other sections.

C. This Section includes building enclosure commissioning (BECx) processes and building enclosure functional performance testing (FPT) requirements.

D. The work under this Section is subject to requirements of the Contract Documents, including the DDC General Conditions.

E. This section includes the commissioning requirements for the building enclosure systems.

1. The commissioning requirements for the building enclosure systems given in this section are entirely separate from, and in addition to, the General Commissioning Requirements for this project. The Contractor, Subcontractors, and Suppliers are required to participate in both commissioning processes as required and any supplemental General Commissioning requirements.

1.3 DEFINITIONS

A. Refer to DDC General Conditions for applicable definitions.

B. Acceptance: A formal action, taken by a person with appropriate authority to declare that some aspect of the project meets defined requirements, thus permitting subsequent activities to proceed.

C. Approval: Acceptance that a material or system has been properly installed and is functioning in tested modes according to the Contract Documents.

D. Basis of Design (BoD): A document that records the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements (OPR) and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

E. Building Enclosure Commissioning (BECx): The process of facilitating the quality installation of the building enclosure materials, components, and systems in accordance with the contract documents. For example, the Curtain Wall System is a component of the Building Enclosure. In addition, the BECx program is a systematic process of ensuring building enclosure systems responsible for environmental separation perform and interact according to design intent and the City of New York's operational needs, as defined in the Owner's Project Requirements (OPR). Verify and document installation and performance of building enclosure materials and systems. The commissioning process does not reduce responsibility of the installing Subcontractors to provide a finished and fully functioning product.

F. Building Enclosure Commissioning Agent (BECA): BECA directs and coordinates Curtain Wall System and Building Enclosure commissioning activities.

G. Building Enclosure Design Intent (BEDI): The design document which details the functional and performance requirements of the building enclosure.

H. Building Enclosure Testing Agency (BETA): A testing agency that is fully accredited by the appropriate governing body for each of the materials, components or systems to be tested or evaluated for compliance with requirements of the contract documents.

I. Commissioning (Cx): The process of ensuring building systems perform interactively according to the Owner's Project Requirements (OPR) for the designated systems.

J. Commissioning Authority (CxA): Contracted to the City of New York. CxA directs and coordinates day-to-day commissioning activities excluding BECx activities. CxA reports directly to Commissioner.

K. Commissioning Plan (Cx Plan): A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the Commissioning Process.

L. Commissioning Process (Cx Process): A quality-focused process for enhancing the delivery of a project. The process focusses upon verifying and documenting that all of the commissioned systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements (OPR).

M. Commissioning Progress Report: A written document which details activities completed as part of the Commissioning Process and significant findings from those activities. The frequency of reporting is often dependent on the completion of major activities or on a monthly basis.

N. Commissioning Team (Cx Team): The individuals responsible for implementing the Commissioning Process, i.e., Commissioner, CxA, Subcontractors, Vendors. The members of the Cx Team will increase from each applicable party during construction, i.e., subcontractors for M/E/P, BAS, TAB, Electrical Test Agent, Curtain Wall Subcontractor, Manufacturers, etc.

O. Deficiency: Condition of a building enclosure material or system that is not in compliance with Contract Documents (that is, does not perform properly or is not complying with design intent).

P. Functional Performance Test (FPT): The process of verifying that a material, product, assembly, or system meets defined performance criteria. The methods and conditions under which performance tests are verified are described in the test procedures.

Q. Owner's Project Requirements (OPR): A written document that details the functional requirements of a project and the expectations of how the facility will be used and operated. This includes project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

B. BECA must review submittals concurrently with Commissioner for conformance (as related to enclosure commissioning only).

1.5 INFORMATIONAL SUBMITTALS

A. Contractor to provide the following, refer also to individual specification requirements:
   1. Qualification Data: For BETA.
   2. Construction Checklists: Contractor must submit Draft Construction Checklists to BECA for review as part of submittals (for each enclosure-related product or system).
   3. Cx Process Submittals: Refer to DDC General Conditions Section 019115 "General Commissioning Requirements for Building Enclosure" for commissioning process submittals.
   4. Mock-up Submittals
      a. Submit test plans including elevations, and relevant testing protocols as required within this specification and within individual specifications.
   5. Shop Drawings, Product Data, and Safety Sheets
   6. Manufacturer test reports.

7. Contractor's Quality Control Plan.
8. Field Quality Test Reports (tests conducted in the field directly by Contractor, Manufacturer, and/or by third-party Building Enclosure Testing Agency (BETA).

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For building envelope systems and components to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements" and Section 019115 "General Commissioning Requirements for Building Enclosure."

B. BETA: Qualified according to ASTM E 699 for testing indicated.

C. Build mockups to evaluate constructability and performance, and demonstrate the coordination of trades and sequencing of work necessary to ensure functional and integrated performance of materials, components, systems, assemblies, and interfaces.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
2. Notify Commissioner, CxA, and BECA seven days in advance of the dates and times when mockups will be constructed and tested.

D. Laboratory Mockups: Build at BETA facility; use personnel, products, and methods of construction that will be used at Project site.

E. Integrated Exterior Mockups: Contractor to build at Project site at locations as directed by the Commissioner. These are often considered visual mock-ups (VMU), not performance mock-ups (PMU) as they may or may not be used for testing.

F. First Installation (In-situ) Mock-ups: After VMUs have been approved and when regular installation is ready to begin, prepare each major exterior enclosure system for observation and functional performance testing at initial installation.
1. Documentation of successful installation method and functional performance testing, as required, must be provided prior to continuing with the system installation.
2. If in compliance, Work tested may remain as part of the completed construction, and may act as the model for subsequent installation.

G. Field Functional Performance Verification: As required or otherwise deemed appropriate by the Commissioner, or BECA, provide additional functional performance verification through field testing required by this section and outlined within the technical specifications. If discrepancies exist between this and technical specifications, the technical specifications will trump.

H. Mockup Systems:

1. Wall Mockups: Extend one full structural bay wide by one full story high plus additional height to connect to assemblies below and above. Include a typical wall to interior floor slab connections.

    a. Minimum Size: 1 full bay, 1 full story, each wall type.

2. Roof Mockups: Include parapet or roof edge conditions, flashings, dunnage, and penetrations.

    a. Minimum Size: 100 sq. ft., each roof type.

3. Horizontal Below-Grade Waterproofing and Slab-on-Grade Mockups: Include edge conditions and typical penetrations.

    a. Minimum Size: 100 sq. ft., each waterproofing type.

4. Vertical Below-Grade Waterproofing Mockups: Include edge, termination, and penetrations.

    a. Minimum Size: 100 sq. ft., each waterproofing type.

5. Building Expansion Joint Mockups: Include starting point at foundation and extend up vertical surfaces, across horizontal waterproofed surfaces and roofs and return to foundation. Include each type of corner, intersection, transition, and termination.

I. Mockups specified for quality assurance and control in the following sections may be combined with Cx mockups for testing purposes.

1. Section 033300 "Architectural Concrete."
2. Section 034100 "Precast Structural Concrete."
3. Section 042000 "Unit Masonry."
4. Section 044200 "Exterior Stonework."
5. Section 047200 “Cast Stone Masonry.”
6. Section 071326 “Self-adhering Sheet Waterproofing.”
7. Section 071416 “Cold Fluid-applied Waterproofing.”
8. Section 072100 “Thermal Insulation.”
9. Section 072715 “Non-bituminous Self-adhering Sheet Air Barrier.”
10. Section 074213.13 “Formed Metal Wall Panels.”
11. Section 074293 “Soffit Panels.”
12. Section 075600 “Cold Liquid-applied Polymethylmethacrylate (PMMA) Hybrid Membrane Roofing.”
13. Section 076200 “Sheet Metal Flashing and Trim.”
14. Section 077273 “Vegetated Roof Systems.”
15. Section 079100 “Preformed Joint Seals.”
16. Section 079200 “Joint Sealants.”
17. Section 081113 “Hollow Metal Doors and Frames.”
18. Section 083113 “Access Doors and Frames.”
19. Section 083123 "Floor Doors.”
20. Section 084213 “Aluminum-framed Entrances.”
21. Section 084413 "Glazed Aluminum Curtain Walls."
22. Section 088000 “Glazing.”

23. Section 088813 “Fire-rated Glazing.”
24. Section 088853 “Security Glazing.”

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 CONSTRUCTION CHECKLIST REVIEW

A. Provide draft Construction Checklists for enclosure-related materials to BECA for review.

B. BECA to return comments on draft Construction Checklist to Commissioner and Contractor within five (5) days of receipt, marked “Reviewed” or “Reviewed with Comment”.

C. Contractor to revise, if necessary, and return correction to Commissioner and BECA within five (5 days) of receipt.

D. When all review comments have been resolved, Commissioner will provide final Construction Checklists, marked "Approved for Use, (date)”.

E. Use only Construction Checklists, marked "Approved for Use, (date)."

3.3 GENERAL TESTING REQUIREMENTS

A. If tests cannot be completed because of a deficiency outside the scope of the building enclosure systems, document the deficiency and report it to Commissioner. After deficiencies are resolved, reschedule tests.

B. If seasonal testing is specified, complete appropriate initial performance tests and documentation and schedule seasonal tests.

C. Coordinate schedule with, and perform Cx activities at the direction of the BECA.

D. Complete all corrective work and provide retesting of failed conditions at no additional cost to the City of New York. The Commissioner reserves the right to select another location for retesting of each failed test, at no additional cost to the City of New York.

3.4 LABORATORY PERFORMANCE MOCKUP TESTING (PMU)

A. Laboratory Mockup Testing Service: Engage a BETA to perform testing on laboratory mockups.

B. Laboratory testing performed by the Building Enclosure Testing Agency (BETA) for the purposes of a PMU (performance mock-up) will be recorded and documented by the BETA and observed by the Commissioner, and/or BECA.

C. Laboratory PMU Testing Program: Perform the tests listed below.

1. Preloading: ASTM E 330 at 50 percent of positive test load for not less than 10 seconds.

    a. No evidence of deflection exceeding specified limits. (see 08 44 13, 2.1.D).
        1) Deflection of Framing Members Supporting Glass: At design wind load, as follows:
            a) Deflection Normal to Wall Plane: Limited to 1/175 of clear span or max 3/4 inch for spans of up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans of greater than 13 feet 6 inches.
            b) Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.
            c) Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
            d) Cantilever Deflection: Limited to 2/175 at unsupported cantilevers.

2. Air Infiltration: ASTM E 283 at a static-air-pressure differential of 6.24 lbf/sq. ft.

    a. Maximum air leakage of .06 cfm.

3. Water Penetration under Static Pressure: ASTM E 331 at minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft.

    a. No evidence of water penetration.

4. Water Penetration under Dynamic Pressure: AAMA 501.1 at minimum air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft.

    a. No evidence of water penetration.

5. Repeat.

6. Loading: ASTM E 330 at 100 percent of positive and negative test loads for not less than 10 seconds.

    a. No evidence of deflection exceeding specified limits.

7. Air Infiltration: ASTM E 283 at a static-air-pressure differential of 6.24 lbf/sq. ft.

    a. Maximum air leakage of .06 cfm.

8. Water Penetration under Static Pressure: ASTM E 331 at minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft.

    a. No evidence of water penetration.

9. Water Penetration under Dynamic Pressure: AAMA 501.1 at minimum air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft.

    a. No evidence of water penetration.

10. Thermal Cycling: AAMA 501.5.

11. Air Infiltration: ASTM E 283 at a static-air-pressure differential of 6.24 lbf/sq. ft.

    a. Maximum air leakage of .06 cfm.

12. Water Penetration under Static Pressure: ASTM E 331 at minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft.

    a. No evidence of water penetration.

13. Vertical Interstory Differential Movement: AAMA 501.7 – complete 10 cycles uniformly in the vertical direction at the intermediate slab simulation.

    a. Interstory drift and seismic loads to be determined by Commissioner prior to PMU construction.

14. Air Infiltration: ASTM E 283 at a static-air-pressure differential of 6.24 lbf/sq. ft.

    a. Maximum air leakage of .06 cfm.

15. Water Penetration under Static Pressure: ASTM E 331 at minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq.

    a. No evidence of water penetration.

16. Water Penetration under Dynamic Pressure: AAMA 501.1 at minimum air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq.

    a. No evidence of water penetration.

17. Horizontal Interstory Differential Movement: AAMA 501.7 – complete 10 cycles uniformly in the horizontal direction parallel to the main elevation at the intermediate slab simulation.

    a. Interstory drift and seismic loads to be determined by Commissioner prior to PMU construction.

18. Air Infiltration: ASTM E 283 at a static-air-pressure differential of 6.24 lbf/sq. ft.

    a. Maximum air leakage of .06 cfm.

19. Water Penetration under Static Pressure: ASTM E 331 at minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft.

a. No evidence of water penetration.

20. Water Penetration under Dynamic Pressure: AAMA 501.1 at minimum air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq ft.

    a. No evidence of water penetration.

21. Overloading: ASTM E 330 at 150 percent of positive and negative test loads.

    a. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
    b. Test Durations: As required by design wind velocity, but not less than 10 seconds.

22. Seismic Movement Displacement: AAMA 501.4 – complete three (3) cycles in the horizontal direction parallel to the main elevation at the intermediate slab simulation.

    a. Interstory drift and seismic loads to be determined by Commissioner prior to PMU construction.

3.5 FIRST-INSTALLATION TESTING & SUBSEQUENT FIELD TESTING

A. BETA: Engage a qualified BETA to perform tests and inspections.

B. Objectives and Scope:
   1. The objective of any Functional Performance Testing is to demonstrate each enclosure system is operating or performing according to documented design intent and Contract Documents.

C. Performance Requirements:
   1. The performance criteria below apply to all first-install mock-up or in-situ field testing of exterior enclosure components and come directly from the technical specifications.
   2. For any field testing, water leakage is only acceptable if all of the following conditions are satisfied:
      a. There is no wetting of a surface that is visible to the building occupants.
      b. There is no staining or other damage to the completed building or finishes.

Component	Water Test	Air Test
07 13 26 Self-adhering Sheet Waterproofing	ASTM D5957 – No leakage. Flood horizontal applications to average depth of 2-1/2” inches with minimum 1” depth and not to exceed 4”. Maintain 2” clearance from top of sheet flashings. Flood each area for 48 hours. *100% of deck before overburden installation and after final inspection.*	
07 27 15 Non-bituminous Self-adhering Sheet Air Barriers		ASTM E1186 – Bubble gun chamber pressurization/ depressurization with detection liquid at penetrations through air barrier; No bubbles observed in leak detection liquid. Must be performed prior to installation of any insulation, cladding, or rainscreen material. *3x at each anchor type, seams, and terminations at each elevation. Locations TBD by Commissioner.*
07 42 13.13 Formed Metal Wall Panels	AAMA 501.2 – Calibrated hose testing. No leakage when tested under a calibrated water spray at 30 - 35psi. *100 lf at 1st install at each elevation.*	

Component	Water Test	Air Test
07 56 00 Cold Liquid-applied Polymethyl Methacrylate (PMMA) Hybrid Membrane Roofing	ASTM D5957 – No leakage. Flood horizontal applications to average depth of 2-1/2” inches with minimum 1” depth and not to exceed 4”. Maintain 2” clearance from top of sheet flashings. Flood each area for 48 hours. *100% of deck before overburden installation and after final inspection.*	
	ASTM C1153 – No leakage. Infrared Thermography of Waterproof Membrane. *100% of deck before overburden installation and after final inspection.*	
07 72 73 Vegetated Roof Systems	ASTM D5957 – No leakage. To be tested in conjunction with each relevant roofing system beneath vegetation. *100% of deck before overburden installation and after final inspection.*	
08 42 13 Aluminum-framed Entrances	ASTM E1105 – minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and to not evidence water penetration. *1 of each type, per elevation. Locations TBD by Commissioner.*	ASTM E783 – ASTM E783 at 1.5 times the rate specified for laboratory testing in “Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static air pressure differential of 1.57 lbf/sq. ft. *1 of each type, per elevation. Locations TBD by Commissioner.*
	AAMA 501.2 – Calibrated hose testing. No leakage when tested under a calibrated water spray at 30 - 35psi. *100%, remaining aluminum-framed entrances.*	

Component	Water Test	Air Test
08 44 13 Glazed Aluminum Curtain Walls	AAMA 501.2 – Calibrated hose testing. No leakage when tested under a calibrated water spray at 30 - 35psi. *1 bay, at least 30'x 1 story; test 3x before each 10%, 35%, & 70% completion. Locations TBD by Commissioner.*	

3. Cold Fluid-Applied Waterproofing Testing (07 14 16):
   a. ASTM D6132 – Liquid-Applied Waterproofing Mil Thickness Testing
      1) Verify thickness of waterproofing during application for each 600 sq. ft. of installed waterproofing or part thereof.
      2) Testing Extent: 100% of detention tanks.

4. Cold Fluid-Applied Waterproofing Testing (07 14 16):
   a. ASTM D4541: Adhesion testing of fluid-applied waterproofing membrane.
      1) Tensile bond strength of membrane to substrate greater than or equal to 220 psi for pedestrian traffic and water flow/containment, as determined by use of an adhesion tester.
      2) 135° peel bond strength of membrane to substrate such that cohesive failure of substrate occurs before adhesive failure of membrane/substrate interface.
      3) In the event the bond strengths are less than the minimum specified, additional substrate preparation is required. Repeat testing to verify suitability of substrate preparation.
      4) Testing extent: 3 tests per every 5,000 sf; min. 3 tests at smaller areas.

5. Air Barrier Testing (per 07 27 15):
   a. ASTM D4541: Adhesion testing of fluid-applied air barrier.
      1) Minimum adhesion of 16 psf (sheathing) and/or 30 psi (concrete/masonry).
      2) Testing extent: 3 tests at each air barrier type at each façade, per each 600 sf; locations as directed by Commissioner (can be conducted w/in 3' of each ASTM E1186 test of air barrier at anchors).

6. Sealant Testing (all types, per 07 92 00):
   a. ASTM C1521, Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints, Method A – Tail Procedure
      1) Allowable: Pass/Fail criteria will be the adhesive failure of the joint.
      2) Initial testing extent: Five (5) tests for each joint type per 1,000 lineal ft.
      3) Subsequent testing extent:
         a) one (1) test for each joint type per 1,000 lineal ft. thereafter *OR*
         b) one (1) test per each floor, per each elevation.

3.6 BUILDING ENCLOSURE TESTING SCHEDULE

A. BECA will provide a BECx Testing Matrix and/or plan & elevation mark-ups identifying locations of testing specifically tailored to the project.

B. The Contractor will input proposed dates for each site visit and test required for the project, in coordination with the BECA. Such dates must be regularly updated throughout the construction process based on project schedule.

C. BECx Testing Matrix provided below is a sample. Actual to be provided during CA Phase.

Components / Test Dates	**Curtain Wall / Fenestration**	**Aluminum Framed Entrances**	**Air Barrier Assembles**	**Roofing System**	**Waterproofin g Systems**	**Sealants**
Lab PMU	*xxxx-xx-xx*					
First Install						
Air Test						
Water Test						
10% Completion						
Air Test						
Water Test						
Other						
35% Completion						
Air Test						
Water Test						
Other						
70% Completion						
Air Test						
Water Test						
Other						

3.7 FIELD OBSERVATIONS & TEST REPORTING

A. BECA will document all installation progress observations of enclosure-related materials.

B. BETA will execute and then document technical results of all FPTs, providing test reports to Contractor, Commissioner, and BECA.

1. Non-Conformance
   a. BECA will record results of functional testing in the form of deficiency or non-conformance issues as part of its field observations. Such issues will be noted and reported to Contractor, and Commissioner.
   b. Corrections of minor deficiencies identified may be made during tests at discretion of BECA. In such cases, deficiency and resolution will be documented.
   c. Every effort will be made to expedite testing and minimize unnecessary delays, while not compromising integrity of tests. BECA must not overlook deficient work or loosen acceptance criteria to satisfy scheduling or cost issues, unless directed to do so by the Commissioner.
   d. Deficiencies will be handled in the following manner:
      1) When there is no dispute on deficiency and Sub-contractor accepts responsibility for remedial action:
         a) BECA documents deficiency and Sub-contractor's response and intentions, then they go on to another test or installation. BECA submits deficiency report to Contractor and Commissioner. Copy is provided to Sub-contractor by Contractor. Sub-contractor corrects deficiency and certifies that material or assembly is ready to be retested. Contractor provides re-testing schedule.
         b) Contractor reschedules test with BETA & BECA (if required).
      2) When there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
         a) BECA documents deficiency and Contractor's response. BECA submits deficiency report to Contractor and Commissioner. Copy is provided to Sub-contractor by Contractor.
         b) Contractor facilitates resolution of deficiency. Other parties are brought into discussions as needed. Final interpretive authority is with Commissioner. Final acceptance authority is with the City of New York.
         c) Contractor documents resolution process.
      3) Once interpretation and resolution have been decided, appropriate party corrects deficiency, Contractor reschedules test, and test is repeated until satisfactory performance is achieved.

3.8 FINAL BECx REPORT

A. All Building Enclosure Commissioning (BECx) documentation will be consolidated by the BECA as Appendices to the Final BECx Report and will be provided to the Commissioner upon Project completion.

1. Final Report Details
   a. Final Building Enclosure Commissioning (BECx) report will include the BECxPlan, an executive summary, list of participants and roles, brief building description, overview of commissioning and testing scope, and general description of testing and verification methods. Report will contain evaluation regarding:
      1) Conformance to specifications and design intent.
      2) Material/system installation.
      3) Functional performance
   b. All outstanding non-compliance items will be specifically listed.
   c. Recommendations for improvement to systems or operations, recommended future actions or maintenance, etc., will also be listed.

2. Upload to LEED Online
   a. Final BECx Report (or necessary parts thereof) will be uploaded to LEED Online for approval and recorded there as complete.

END OF SECTION 019119.43

SECTION 01 95 00
AS-BUILT BIM MODEL

PART I - GENERAL

1.1. RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract (City of New York Standard Construction Contract).

B. The BIM Execution Plan, prepared by the Construction Manager (CM) under separate contract with the City of New York, contains requirements that apply to this section.

1.2 SUMMARY

A. The primary objective is an implemented process focused on the development of an "as built" BIM file in order to be leveraged to manage and operate the building once construction is completed.

B. "As-built" Building Information Model (BIM) - models created by the contractor to document the project including but not limited to:

1. Architecture
2. Structural Steel
3. Miscellaneous Steel
4. Roof Structure
5. Concrete
6. HVAC
7. Electrical
8. Plumbing
9. Fire Protection
10. Fire Alarm
11. Communications
12. Security

C. Commissioner will provide 2D CAD drawings for reference purposes at the outset of construction and limited CAD updates at major bulletin issuances. Contractor is responsible for maintaining their own up-to-date digital models based on latest construction information, and exhaustive CAD updates will not be provided.

D. All relevant models will be incorporated into one comprehensive “as-built” BIM file.

1.3 DEFINITIONS

A. 3D - three dimensional; objects that include width, depth and height.

B. "As-built" - Documented information upon completion of a project. Reflecting all built and existing elements all changes made in the specifications and working drawings during the construction process, and show the exact dimensions, geometry, and location of all elements of the work completed under the contract.

C. Building Information Modeling (BIM) – An integrated process aimed at providing coordinated, reliable information about a building project.

D. Level of Development (LOD) - the level of completeness to which a Model Element is developed; the amount of detail in and the level of data tied to a modeled element.

1.4 SUBMITTALS

A. Refer to DDC General Conditions Section 013300 “Submittal Procedures.”

B. Refer to DDC BIM Guidelines and BIM Execution Plan for submittal requirements.

C. Digital Submittal Requirements - All submitted electronic files must be compatible with the version of the Autodesk Revit software currently being used by CM and must conform and comply with the latest version of CM BIM Standard. Projects will be initiated and completed in the same version of the software – no mid-project version upgrades.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 01 40 00 “Quality Requirements”.

PART II – PRODUCTS

2.1 MODELS

A. Contractor's "as-built" Model: The As-built model will be confirmed by each Subcontractor to ensure all scope of work on site is captured as installed. The "as built" BIM file will be leveraged to manage and operate the building once construction is completed, to that extent, the BIM will include fields (parameters) to support this effort. These fields will be defined and incorporated within the BIM at the Construction phase with the input of the people responsible for maintenance and operations.

B. Contractor will supply a 3D BIM model for each individual trade scope of work separated by areas as directed by DDC BIM Guidelines.

C. BIM models will be Level of Detail (LOD) "500" as per DDC BIM Guidelines.

2.2. SOFTWARE

A. Software requirements are as follows unless written approval to vary is provided by the Commissioner.

1. Contractor will supply a 3D BIM model for each individual trade scope of work separated by areas as directed by DDC BIM Guidelines.

2.3. RESPONSIBILITY

A. Contractor is responsible for incorporating all information to include but not limited to:

1. RFI Responses
2. Submittals
3. Change Orders
4. Bulletins
5. Coordination drawings

B. Ownership:

1. The BIM file, CADD files, AutoCAD architecture files, TIF files, shop drawings, RFI's, as-built drawings, etc. (collectively "Project Information") are the property of the City of New York.

PART III – EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 MODELING PROCESS

A. Record Information

1. Upon completion of the BIM model deemed appropriate by Commissioner, a 2D drawing or series of drawings representing the floor or area will be printed (or electronically distributed as approved by Commissioner) for review by all members participating in the coordination.
2. The Contractor will deliver to the Owner, at the completion of the project, a record "as built" BIM model in the latest version of Autodesk Revit (or software as approved by Commissioner) that incorporates all the trade models, fabrication models and updated design models. The native files from each trade must also be provided.

3.3 3D MODELING

A. System Models and Level of Detail:

1. The level of detail defined in each section below (Modeling Standards) and the DDC BIM Guidelines is the minimum level of detail required in the model.
2. To the extent that location can be determined from the construction documents, the model will reflect that location. The intent of this model is to show the ductwork and piping, and similar items in as true representation of the actual condition at construction completion.

3. Access zones should be drawn at 60% shading as not to obscure the main fixture or element being protected or must have another similar identifying characteristic.
4. Individual model elements (such as VAV boxes, pumps, and similar items) described in further detail below must each contain the specific and individual name assigned to it as per the Contract Documents, following the approved naming conventions established by the Contractor's Virtual Design and Construction (VDC).

B. Modeling Standards:

1. HVAC Sheet Metal Standards
   a. All ducts, related accessories (including but not limited to standard dampers, fire dampers, VAV boxes, diffusers, turning vanes, etc.) and HVAC equipment will be modeled.
   b. Ducts will be modeled to the outside face dimension of duct or duct insulation. Hangers must be modeled where necessary to coordinate with the work of other trades.
   c. Access zones must be modeled for all elements requiring access including but not limited to equipment, fixtures, standard dampers, fire dampers, VAV boxes, diffusers, turning vanes, and similar items.
2. HVAC Piping Standards
   a. All piping, related accessories (valves, air vents, drain valves, flow meters, etc.) and HVAC equipment will be modeled.
   b. Pipes will be modeled to the outside diameter of the pipe or pipe insulation. Hangers must be modeled where necessary to coordinate with the work of other trades.
   c. Equipment will be modeled to its overall height, width and depth.
   d. Access zones must be modeled for all elements requiring access including but not limited to equipment, fixtures and valves.
   e. All access panels must be modeled, including access zones above and below.
3. Plumbing and Specialty Piping Standards
   a. All plumbing, specialty piping, related accessories (valves, air vents, drain valves, flow meters etc.) and equipment will be modeled (piping 1-1/2" diameter or larger). Process piping 2" diameter or larger must be modeled.
   b. Pipes will be modeled to the outside diameter of the pipe or the pipe insulation. Pipe slope will be incorporated in the model. Hangers must be modeled where necessary to coordinate with the work of other trades.
   c. Equipment will be modeled to its overall height, width and depth.
   d. Access zones must be modeled for all elements requiring access including but not limited to equipment, fixtures, valves and cleanouts.
   e. All access panels must be modeled, including access zones above and below.
4. Electrical Standards
   a. All conduit/MC cabling (1- 1/2" diameter and larger), power feeds to equipment, switch gear, panels, junction box and pull station locations will be modeled. Where groups of smaller conduit totaling 1-

1/2" diameter or larger are located, a graphic representation of the overall dimension of the grouped conduit may be substituted.

5. Light fixtures with above-ceiling space requirements are to be included in the model and coordinated with reflected ceiling plan. All access zones or clearances to maintain light fixtures will also be modeled.
   a. Equipment and cable tray with access zones to be included in the model along with strut channel supports. Equipment will be modeled to its overall height, width and depth.
   b. Equipment and junction box access zones per specification and code (whichever is greater) must be modeled.
   c. All access panels must be modeled, including access zones above and below.
6. Fire Protection (Sprinkler, Fire Alarm)
   a. All components of the fire protection system will be modeled.
   b. Access zones must be modeled for all elements requiring access including but not limited to equipment, fixtures, valves and controllers.
   c. Locate all piping, valves, fire pump, sprinkler heads, heat and smoke detectors.
   d. All access panels must be modeled, including access zones above and below.
7. Concrete
   a. All concrete must be modeled.
8. Structural Steel
   a. All structural steel must be modeled, including but not limited to columns, beams, braces, gusset plates, connections, reinforcing plates and angles, pour stops, metal grating, seismic or secondary supports and beam penetrations.
   b. The model elements must contain non-graphic information that associates each element with its erection sequence as appropriate and identifies the size of the structural element.

END OF SECTION 01 95 00

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

B. Related Requirements:

1. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to City of New York that may be uncovered during demolition remain the property of City of New York.

1. Carefully salvage in a manner to prevent damage and promptly return to City of New York.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 INFORMATIONAL SUBMITTALS

A. Engineering Survey: Submit engineering survey of condition of building.

B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for dust control and , for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure City of New York's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of City of New York's continuing occupancy of portions of existing building and of City of New York's occupancy of completed Work.

D. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with DDC General Conditions. Submit before Work begins.

1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 FIELD CONDITIONS

A. Notify Commissioner of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

B. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If Hazardous materials are encountered, stop the Work and immediately notify the Commissioner.

C. Storage or sale of removed items or materials on-site is not permitted.

D. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with City of New York's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with all federal, NY State, and City of New York hauling and disposal regulations.

B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by City of New York. City of New York does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Survey of Existing Conditions: Record existing conditions by use of measured drawings.

1. Inventory and record the condition of items to be removed and salvaged.
2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions per DDC General Conditions.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Commissioner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to City of New York.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with DDC General Conditions for requirements of temporary enclosures, dust control, heating, and cooling.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly. Comply with DDC General Conditions.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Commissioner, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with DDC General Conditions.

B. Burning: Do not burn demolished materials.

3.8 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.9 SELECTIVE DEMOLITION SCHEDULE

A. Remove: Including but not limited to existing electric lines, fence, light poles, sewer/stormwater lines, sewer manholes, walkways, stairs, trees, grass, knee walls, drains, benches, etc. See demolition plans for details..

B. Remove and Reinstall: 5 bike racks, parking meter/ticket machine.

END OF SECTION 024119

SECTION 02 80 13 – GENERAL CONTRACTOR WORK
NOVEMBER 2022 VERSION

ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

1.01 SCOPE FOR ASBESTOS ABATEMENT WORK

A. The "General Conditions" apply to the work of this Section.

B. The Asbestos abatement contractor shall remove asbestos containing materials as needed to perform the other work of this Contract when discovered during the course of work. When required, the Asbestos abatement contractor shall replace the ACM with non-asbestos containing materials. An allowance of **$15,000.00** for the **General Contractor** is herein established for this incidental work when so ordered and authorized by the Commissioner.

C. All work shall be done in accordance with the applicable provisions of the rules and regulations of the asbestos control program as promulgated by Title 15 Chapter I of RCNY and New York State Department of Labor Industrial Code Rule 56 cited as 12 NYCRR Part 56, whichever is more stringent as per latest amendments to these laws and as modified herein by these specifications.

D. All disposal of asbestos contaminated material shall be per Local Law 70/85.

E. The asbestos abatement contractor's attention is directed to the fact that certain methods of asbestos abatement are protected by patents. To date, patents have been issued with respect to "negative pressure enclosure" or “negative-air” or "reduced pressure” and "glove bag".

F. The asbestos abatement contractor shall be solely responsible for and shall hold the Department of Design and Construction and the City harmless from any and all damages, losses and expenses resulting from any infringement by the asbestos abatement contractor of any patent, including but not limited to the patents described above, used by the asbestos abatement contractor during performance of this agreement.

G. "Asbestos" shall mean any hydrated mineral silicate separable into commercially usable fibers, including but not limited to chrysotile (serpentine), amosite (cumingtonite-grunerite), crocidolite (riebeckite), tremolite, anthrophyllite and actinolite.

H. Prior to starting, the asbestos abatement contractor must notify the Commissioner of the Department of Design and Construction if he/she anticipates any difficulty in performing the Work as required by these Specifications. The asbestos

abatement contractor is responsible to prepare and submit all filings, notifications, etc. required by all City, State and Federal regulatory agencies having jurisdiction.

The asbestos abatement contractor is responsible for submitting the Asbestos Project Notification Form (ACP-7 Form) to the Department of Environmental Protection, Asbestos Control Program, as per Title 15, Chapter I of RCNY and to the NYSDOL as per Industrial Code Rule 56.

The asbestos abatement contractor is responsible for preparing and submitting Asbestos Variance Application (ACP-9). If a Variance is required, the asbestos abatement contractor is responsible to retain a NYSDOL Asbestos Project Designer, as defined in Title 15, Chapter 1 of the RCNY to prepare and submit the required variance.

The General Contractor is responsible for preparing and submitting an Asbestos Abatement Permit and/or Work Place Safety Plans (WPSP) that may be required for the completion of the Contract or incidental work. If such plans are required, the General Contractor is responsible for retaining a registered design professional as defined in Title 15, Chapter 1 of the RCNY to prepare and submit the required plans.

The asbestos abatement contractor is responsible for the submission of all required documents to the NYCDEP to acquire the appropriate Asbestos Project Conditional Closeout (ACP-20) and/or Asbestos Project Completion Forms (ACP-21) on a timely basis for the completion of the incidental work encountered under this contract.

The asbestos abatement contractor will be required to attend an on-site job meeting with the Construction Project Manager prior to the start of work to examine conditions and plan the sequence of operations, etc.

The asbestos abatement contractor shall have a NYSDOL/NYCDEP Asbestos Supervisor onsite to oversee the work and conduct a final visual inspection as required by both Title 15, Chapter 1 of the RCNY and NYSDOL Industrial Code Rule 56.

I. All work shall be done during regular working hours unless the asbestos abatement contractor requests authorization to work in other then regular working hours and such authorization is granted by the Commissioner. (Regular work hours are those hours during which any given facility, in which work is to be done, is customarily open and functioning, normally between the hours of 8:00 A.M. and 4:00 P.M. Monday - Friday.) If such work schedule is authorized by the Commissioner, the work shall be done at no additional cost to the City.

J. The Commissioner may order that work be done in other than regular working hours as herein by defined and this order may require the asbestos abatement

contractor to pay premium or overtime wages to complete the work. If the Commissioner orders work in other than regular working hours, the asbestos abatement contractor shall multiply the unit price for that portion of the work requiring premium wages by 1.50 when computing payment in accordance with Paragraph 1.09. All requests for premium payment must be supported by certified payroll sheets and field sheets approved by the Construction Project Manager.

1.02 QUALIFICATIONS OF ASBESTOS ABATEMENT CONTRACTOR

A. Requirements: The asbestos abatement contractor must be approved through the Department's Request for Subcontractor Approval, administered by the Agency Chief Contracting Office (ACCO), Vendor Integrity Unit. The asbestos abatement contractor must demonstrate compliance with the special experience requirements set forth in subparagraphs (1) through (6) below. Such documentation shall include without limitation, all required licenses, certificates, and documentation.

1. The asbestos abatement contractor must, whether an individual, corporation, partnership, joint venture or other legal entity, demonstrate for the three-year period prior to the work that it has been licensed by the New York State Department of Labor (NYSDOL), as an "Asbestos Abatement Contractor". The asbestos abatement contractor shall submit copies of the asbestos abatement contractors NYSDOL License for the past three years

2. The asbestos abatement contractor must, for the three-year period prior to the work, have been in the business of providing asbestos abatement services as a routine part of its daily operations.

3. The asbestos abatement contractor proposing to do asbestos abatement work must be thoroughly experienced in such work and must submit a list of five (5) asbestos abatement projects of similar size and complexity. The aggregate cost of these projects must be at least $1,000,000 in each of the three years.

4. For each project submitted to meet the experience requirements set forth above, the asbestos abatement contractor must submit the following information for the project; name and location of the project; name title and telephone number and email address of the owner or the owner's representative who is familiar with the asbestos abatement contractor's work; brief description of the scope of work completed as a prime or sub-asbestos abatement contractor; amount of contract or subcontract and the date of completion.

5. The asbestos abatement contractor must demonstrate that it has the financial resources, certified supervisory personnel and equipment

necessary to carry out the work and to comply with the required performance schedule, taking into consideration other business commitments. The asbestos abatement contractor must submit such documentation as may be required by the Department of Design and Construction to demonstrate that it has the requisite capacity to perform the required services of this contract. The Department may also conduct an inspection of the asbestos abatement contractor's facility to verify if the contractor has equipment and staffing to perform the work.

6. The asbestos abatement contractor must submit a copy of their Corporate Health and Safety Plan for review and acceptance. A Job Hazard Analysis (JHA) for the specific work conducted must be included.

B. Throughout the specifications, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics thereof. Provide materials or workmanship that meet or exceed the specifically named codes or standards where required by these specifications.

C. Site Investigation: Asbestos abatement contractor shall inspect all the specifications and related drawings and will investigate and confirm the site conditions affecting the work, including, but not limited to (1) through (5) below. The asbestos abatement contractor will attend a walkthrough site inspection with the department's Project Manager and the Third-Party Air Monitor prior to the work. Such walkthrough will be scheduled at the Department's convenience.

1. Physical considerations and conditions of both the material and structure. These considerations include any obstacles or obstructions encountered in accessing or removing the material.

2. Handling, storage, transportation and disposal of the material.

3. Availability of qualified and skilled labor.

4. Availability of utilities.

5. Exact quantities of all materials to be disturbed and/or removed

1.03 ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITIES

The asbestos abatement contractor will visit the subject location within one (1) working day of notification to ascertain actual work required. If the project is identified as being "urgent", then work shall commence no later than 48 hours from the time of notification. In this event, the asbestos abatement contractor shall immediately notify when applicable EPA NESHAPS Coordinator, NYSDOL Asbestos Control Bureau and NYCDEP

Asbestos Control Program of start of the work and file the necessary Asbestos Notifications and any applicable Variance Applications with the regulatory agencies cited above.

In the event that the project is not classified as "urgent" the asbestos abatement contractor shall notify the EPA NESHAPS Coordinator, NYSDOL and NYCDEP by submitting the requisite asbestos project notification forms, postmarked 10 days before activity begins if 260 linear feet or more and/or 160 square feet or more of asbestos containing material will be disturbed.

The following information must be included in the notification:

A. Name and address of building City or operator;

B. Project description:

1. Size - square feet, number of linear feet, etc;

2. Age - date of construction and renovations (if known);

3. Use - i.e., office, school, industrial, etc.

4. Scope - repair, demolition, cleaning, etc.

C. Amount of asbestos involved in work and an explanation of techniques used to determine the amount;

D. Building location/address, including Block and Lot numbers;

E. Work schedule including the starting and completion dates;

F. Abatement methods to be employed;

G. Procedures for removal of asbestos-containing material;

H. Name, title and authority of governmental representative sponsoring project.

1.04 WORK INCLUDED IN UNIT PRICE

The asbestos abatement contractor will be paid a basic unit price of **$25.00** per square feet for the removal and disposal of asbestos containing material and replacement of the same with non-asbestos containing materials.

Unit price shall include all costs necessary to do the work of this Contract, including but not limited to: labor, materials, equipment, utilities, disposal, insurance, overhead and profit.

1.05 AIR MONITORING – ASBESTOS ABATEMENT CONTRACTOR

A. "Air Sampling" shall mean the process of measuring the fiber content of a known volume of air collected during a specific period of time. The procedure utilized for asbestos follows the NIOSH Standard Analytical Method 7400 or the provisional transmission electron microscopy methods developed by the USEPA and/or National Institute of Standard and Technology which are utilized for lower detectability and specific fiber identification.

B. Air monitoring of asbestos abatement contractor's personnel will be performed in conformance with OSHA requirements, (All costs associated with this work are deemed included in the unit price.).

C. Qualifications of Testing Laboratory:

The industrial hygiene laboratory shall be a current proficient participant in the American Industrial Hygiene Association (AIHA) PAT Program. The laboratory identification number shall be submitted and approved by the City. The laboratory shall be accredited by the AIHA and New York State Department of Health Environmental Laboratory Approval Program (ELAP).

Note: Work area air testing and analysis before, during and upon completion of work (clearance testing) will be performed by a Third Party Air Monitor under separate Contract with the City.

1.06 THIRD PARTY MONITORING AND LABORATORY

A. The NYCDDC, at its own expense, will employ the services of an independent Third-Party Air Monitoring Firm and Laboratory. The Third-Party Air Monitor will perform air sampling activities and project monitoring at the Work Site.

B. The Laboratory will perform analysis of air samples utilizing Phase Contrast Microscopy (PCM) and/or Transmission Electron Microscopy (TEM).

C. The Third-Party Air Monitoring Firm and the designated Project Monitor shall have access to all areas of the asbestos removal project at all times and shall continuously inspect and monitor the performance of the asbestos abatement contractor to verify that said performance complies with this Specification. The Third-Party Air Monitor shall be on site throughout the entire abatement operation.

D. The NYCDDC will be responsible for costs incurred with the Third-Party Air Monitoring Firm and laboratory work. Any subsequent additional testing required due to limits exceeded during initial testing shall be paid for by the asbestos abatement contractor.

1.07 PAYMENT REQUEST DOCUMENTATION

B. The following information shall be included for each payment request:

1. Description of work performed.

2. Linear footage and pipe sizes involved.

3. Square footage for boiler & breaching insulation removed.

4. Square footage of non-pipe and boiler areas removed, patched, enclosed, sealed, or painted.

5. Square footage of encapsulation, sealing, patching, and painting involved.

6. Total cost associated with compliance with the assigned task.

7. Architectural, Electrical, HVAC, Plumbing, etc. work incidental to the Asbestos Abatement Work.

8. A certified copy (in form 4312-39) to the Comptroller or Financial Officer of the New York City to the effect that the financial statement is true.

9. A signed copy (in form 6506q-6) of certificate of compliance with non-discriminatory provisions of the Contract.

10. Attach a copy of valid workmen compensation insurance.

11. Valid asbestos insurance per occurrence.

12. General liability insurance when required.

C. Each payment request shall include a grand total for all work completed that billing period, the landfill waste manifests and a copy of waste transporter permit. The Department of Design and Construction will inspect the work performed, review the cost and approve or disapprove requests for payment.

D. EXPOSURE LOG: With this final payment, the asbestos abatement contractor shall submit a listing of the names and social security numbers of all employees actively engaged in the abatement work of this Contract. This list shall include a summary showing each part of the abatement work in which the employee was engaged and the dates thereof.

1.08 QUANTITY CALCULATIONS

In order to determine the square footage involved for the various pipe sizes of pipe insulation that might be encountered, the following table is to be used.

PIPE INSULATION SIZE O.D.	PIPE SIZE O.D.	SQUARE FOOTAGE PER LINEAR FOOT
2-1/2"	1/2"	0.65
2-3/4"	3/4"	0.72
3"	1"	0.79
3-1/4"	1-1/4"	0.85
3-1/2"	1-1/2"	0.92
4"	2"	1.05
4-1/2"	2-1/2"	1.18
5”	3”	1.31
6"	3-1/4"	1.57
7"	3-1/2"	1.83
8"	4"	2.09
9”	5"	2.36
10"	6"	2.62
12"	8"	3.14
14"	10"	3.67
16"	12"	4.19
18"	l4”	4.71

1.09 METHOD OF PAYMENT

Payment shall be made in accordance with Items A through R below. Payment shall be calculated based on the actual quantity of the item performed by the asbestos abatement contractor, times the unit price specified below. Credits may apply to certain times, as specified below.

A. **REMOVAL, DISPOSAL AND REPLACEMENT OF ASBESTOS CONTAINING PIPE INSULATION:** Actual linear footage, multiplied by the square footage factor listed for the respective pipe size in Section 1.08, multiplied by the unit price in Section 1.04.

EXAMPLE: 100 lin.ft. of 1/2" pipe and 100 lin.ft. of 6" pipe, including elbows, tees. Flanges, etc.

100 X 0.65 = 65 sq.ft. 65 x unit price = Payment

100 X 2.62 = 262 sq.ft. 262 x unit price = Payment

B. **REMOVAL, DISPOSAL AND REPLACEMENT OF BOILER INSULATION:** (all types including Silicate Block and including the removal/replacement of metal jacketing) Payment shall be made at 1.5 times the unit price per square foot.

EXAMPLE: Item B. removal and replacement of 1000 S.F. of boiler insulation (incl. Silicate block)

1000 S.F. X (1.5) X the Unit Price = Payment

C. **REMOVAL, DISPOSAL AND REPLACEMENT OF TANK INSULATION:** (all types including removal/replacement of metal jacketing) Payment shall be made at 1.5 times the unit price per square foot.

D. **REMOVAL, DISPOSAL AND REPLACEMENT OF BOILER UPTAKE, & BREACHING INSULATION:** (all types including stiffening angles and wire lath) Payment shall be made at 2.0 times the unit price per square foot.

E. **REMOVAL, DISPOSAL AND REPLACEMENT OF DUCT INSULATION:** Payment shall be made at 1.0 times the unit price per square foot.

F. **REMOVAL, DISPOSAL AND REPLACEMENT OF SOFT ASBESTOS CONTAINING MATERIAL:** (Including sprayed-on fire proofing and sound proofing) Payment shall be made at 1.0 times the unit price per square foot of surface area. Area of irregular surfaces must be calculated and confirmed with DDC representative.

G. **ACOUSTIC PLASTER REPAIR AND/OR ENCAPSULATION:** Payment shall be made at 0.5 times the unit price per square foot.

H. **PATCHING OR REPAIR** of items listed in A through F will be paid at 0.33 times the unit price per square foot.

I. **REMOVAL, DISPOSAL AND REPLACEMENT OF WATERPROOFING ASBESTOS CONTAINING MATERIAL: (**including friable and non-friable waterproofing material from interior and exterior walls, floors, foundations, penetrations, louvers, vents and openings other than windows, doors and skylights) Payment shall be made at 0.5 times the unit price per square foot.

J. **REMOVAL, DISPOSAL AND REPLACEMENT OF ASBESTOS CONTAINING ELECTRICAL WIRING INSULATION:** (including friable and non-friable wiring insulation) Payment shall be made at 0.33 times the unit price per square foot.

K. **PAINTING:** Payment shall be made at 0.05 times the unit price per square foot.

L. **REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING PLASTER:** from ceilings and walls, including any wire lath and disposal as asbestos containing waste. Payment shall be made at 0.80 times the unit price per square foot.

M. **REMOVAL AND DISPOSAL OF ASBESTOS-CONTAINING FLOOR TILES, CEILING TILES, TRANSITE PANELS:** (including any adhesive, glue, mastic and/or underlayment) and disposal as asbestos containing waste. Payment shall be made at 0.40 times the unit price per square foot. If multiple

layers are discovered, each additional layer shall be paid at 0.20 times the unit price per square foot.

N. **ADDITIONAL CLEAN UP/HOUSEKEEPING OF WORK AREA:** (excluding pre-cleaning of work area required by regulations) HEPA vacuuming and wet cleaning of asbestos contaminated surface. Payment shall be made at 0.20 times the unit price per square foot. When GLOVE BAG is employed to remove ACM, cost of HEPA vacuuming and wet cleaning of floor area up to 3 feet on each side of glove-bag shall be included in unit price and no extra payment will be made.

O. **REMOVAL, DISPOSAL OF ASBESTOS-CONTAINING ROOFING MATERIAL:** including mastic, flashing and sealant compound and provide temporary asbestos-free roof covering consisting of one layer of rolled roofing paper sealed with asphaltic roofing compound. Payment shall be made at 0.8 times the unit price per square foot. Credit at a rate of 0.33 times the unit price will be taken for each square foot of temporary roof covering which the asbestos abatement contractor is directed not to install.

P. **PICK-UP AND DISPOSAL OF GROSS DEBRIS:** (excluding any waste generated from abatement under Item A-R) at a rate of $150 per cubic yard for asbestos contaminated waste and $75 per cubic yard for non-asbestos contaminated waste. This cost includes all labor and material cost associated with work.

Q. **REMOVAL OF ASBESTOS-CONTAINING BRICK, BLOCK, MORTAR, CEMENT OR CONCRETE:** along with all surfacing materials including wire lath and/or other supporting structures and disposal as ACM waste. Payment shall be made at a rate of $25.00 per cubic foot of material removed.

R. **REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING WINDOW/DOOR CAULKING:** including friable and non-friable caulking, weather-stripping, glazing, sealants, or other waterproofing materials applied to windows, doors, skylights, etc. Payment shall be made at the rate of $400.00 per opening regardless of size or configuration. This cost includes labor, consumable materials, set-up/breakdown, removal, and disposal, as required.

Note 1: CREDIT: For items listed in A through F, a credit at a rate of 0.33 times the unit price, times the respective multiplier (for each item) will be taken for each square foot of insulation which the asbestos abatement contractor is not directed to reapply.

Note 2: MINIMUM PAYMENT: The minimum payment per call at any individual job sites or various job sites during the same day will be eight hundred dollars ($800.00).

Note 3: All payments shall be made as described in paragraph 1.09 herein**.**

Note 4: WORKING HIGHER THAN 12 FEET ABOVE FLOOR LEVEL OR WORK REQUIRING COMPLEX SCAFFOLDING OR CONSTRUCTION WORK

PLATFORMS: Provisions are made in this Contract to compensate the asbestos abatement contractor for work performed in locations that are difficult to access due to work at elevations that are significantly higher than the normal work level. The unit price for these items will be paid at 1.20 times the unit price described in Paragraphs 1.09, A through R for those portions of the work that are more than twelve (12) feet above the grade for that would be judged as the normal working level.

1.10 GUARANTEE

A. Work performed in compliance with each task shall be guaranteed for a period of one year from the date the completed work is accepted by the Department of Design and Construction.

B. The Commissioner of The Department of Design and Construction will notify the asbestos abatement contractor in writing regarding defects in work under the guarantee.

1.11 OCCUPANCY OF SITE NOT EXCLUSIVE

Attention is specifically drawn to the fact that contractors, performing the work of other Contracts, may be brought upon any of the work sites of this Contract. Therefore, the asbestos abatement contractor shall not have exclusive rights to any site of his work and shall fully cooperate and coordinate his work with the work of other contractors who may be brought upon any site of the work of this Contract. This paragraph applies to those areas outside the regulated Work Area as defined by Title 15, Chapter I of RCNY.

1.12 SUBMITTALS

A. Pre-Construction Submittals:

1. Attend a pre-construction meeting scheduled by the City of New York Department of Design and Construction. This meeting shall also be attended by a designated representative of the City of New York third party air monitoring firm, facility manager and the Construction Project Manager. At this meeting, the asbestos abatement contractor shall present three copies of the following items:
   a. asbestos abatement contractor's scope of work, work plan and schedule.

   b. Asbestos project notifications, approved variances and plans to Government Agencies.

   c. Copies of Permits, clearance and licenses if required.

   d. Schedules: the asbestos abatement contractor shall provide to the Construction Project Manager a copy of the following schedules for

approval. Once approved, schedules shall be maintained and updated as received. asbestos abatement contractor shall post a copy of all schedules at the site:

(1) A construction schedule stating critical dates of the project including, but not limited to, mobilization, Work Area preparation, demolition, gross removal, fine cleaning, encapsulation, inspections, clearance monitoring, and phase of refinishing and final inspections. The schedule shall be updated biweekly, at a minimum.

(2) A schedule of staffing stating number of workers per shift per activity, name and number of supervisor(s) per shift, shifts per day, and total days to be worked.

(3) Submit all changes in schedule or staffing to the Construction Project Manager prior to implementation.

e. Written description of emergency procedures to be followed in case of injury or fire. This section must include evacuation procedures, source of medical assistance (name and telephone number to nearest hospital) and procedures to be used for access by medical personnel (examples: first aid squad and physician). NOTE: Necessary Emergency Procedures Shall Take Priority Over All Other Requirements of These Specifications.

f. Safety Data Sheets (SDS) for encapsulants, sealants, firestopping foam, cleaners/disinfectants, spray adhesive and any and all potentially hazardous materials that may be employed on the project. No work involving the aforementioned will be allowed to proceed until SDS are reviewed.

g. Worker Training and Medical Surveillance: The asbestos abatement contractor shall submit a list of the persons who will be employed by him /her to perform the removal work. Present evidence that workers have received proper training required by the regulations and the medical examinations required by OSHA 29 CFR 1926.1101.

h. Logs: Specimen copies of daily progress log, visitor's log, and disposal log.

(1) The asbestos abatement contractor shall provide a permanently bound logbook of minimum 8-1/2” x 11” size at the entrance to the Worker and Waste Decontamination enclosure system as hereinafter specified. Logbook shall

contain on title page the project name, name, address and phone number of the asbestos abatement contractor; name, address and phone number of asbestos abatement contractor and City's third party air monitoring firm; emergency numbers including, but not limited to local Fire/Rescue Department. Logbook shall contain a list of personnel approved for entry into the Work Area.

(2) All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted. Any significant events occurring during the abatement project shall be entered into the log. Upon completion of the job, the asbestos abatement contractor shall submit the logbook containing a day-to-day record of personnel log entries countersigned by the Construction Project Manager every day.

i. Worker's Acknowledgments: Submit statements signed by each employee that the employee has received training in the proper handling of ACM, understands the health implications and risks involved; and understands the use and limitations of the respiratory equipment to be used.

B. During Construction Submittals:

1. Security and safety logs showing names of person entering workspace, date and time of entry and exit, record of any accident, emergency evacuation, and any other safety and/or health incident.

2. Progress logs showing the number of workers, supervisors, hours of work and tasks completed shall be submitted daily to the Construction Project Manager.

3. Floor plans indicating asbestos abatement contractor's current work progress shall be submitted for review by the Construction Project Manager.

4. All asbestos abatement contractors' air monitoring and inspection results.

C. Project Closeout Submittals:

Upon completion of the project and as a condition of acceptance, the asbestos abatement contractor shall present two copies of the following items, bound and indexed:

1. Lien Waivers from asbestos abatement contractor, sub-asbestos abatement contractors and Suppliers,

2. Daily OSHA air monitoring results,

3. All Waste Manifests (Asbestos and Construction Debris), seals and disposal logs,

4. Field Sign-In/Sign-Out Logs for every shift,

5. Copies of all Building Department Forms and Permits,

6. A Letter of Compliance stating that all the work on this project was performed in accordance with the Specifications and all applicable Federal, State and Local regulations,

7. All Warranties as stated in the Specifications,

    a. Fully executed disposal certificates and transportation manifest.

8. Project Record: The asbestos abatement contractor shall maintain a project record for all small and large asbestos projects. During the project, the project record shall be kept on site at all times. Upon completion of the project, the project record shall be maintained by the building owner. The project record shall be submitted to DDC as part of the close out documents. The project record shall consist of:

    a. Copies of licenses of all asbestos abatement contractors involved in the project;

    b. Copies of NYCDEP and NYSDOL supervisor and handler certificates for all workers engaged in the project;

    c. Copies of all project notifications and reports filed with NYCDEP, NYSDOL and USEPA for the project, with any amendments or variances;

    d. Copies of all asbestos abatement permits, including associated approved plans and work place safety plan;

    e. A copy of the air sampling log and all air sampling results;

    f. A copy of the abatement asbestos abatement contractor's daily log book;

g. Copies of all asbestos waste manifests;

h. A copy of all Project Monitor's Reports (ACP-15).

i. A copy of each ATR-1 Form completed for the asbestos project (if required).

j. A copy of each Asbestos Project Conditional Closeout Report (ACP-20) if required.

k. A copy of the Asbestos Project Completion Form (ACP-21).

1.13 PROTECTION OF FURNITURE AND EQUIPMENT

Cover all furniture and equipment that cannot be removed from Work Areas. Movable furniture and equipment will be removed from Work Areas by the asbestos abatement contractor prior to start of work. At the conclusion of the work (after final air testing), the asbestos abatement contractor will remove all plastic covering on walls, floors, furniture, equipment and reinstall furniture and equipment. He shall remove and store all sheaths, curtains and drapes, and reinstall same following final clean up.

1.14 UTILITIES

A. General:

All temporary facilities shall be subject to the approval of the Commissioner. Prior to starting work at any site, locations and/or sketches (if required) of temporary facilities must be submitted to the Construction Project Manager for the required approval.

B. Water:

The Department of Design and Construction will furnish all water needed for construction, at no cost to the asbestos abatement contractor in buildings under their jurisdiction. However, it is the responsibility of the asbestos abatement contractor to ensure that hot water is provided for showering in the decontamination unit. The asbestos abatement contractor shall furnish, install and maintain any needed equipment to meet these requirements at his own expense.

C. Electricity:

The Department of Design and Construction will furnish all electricity needed for construction, at no cost to the asbestos abatement contractor in a building, under their jurisdiction. The asbestos abatement contractor is responsible for routing the electric power to the abatement Work Area.

All temporary lighting and temporary electrical service for Work Area shall be in weatherproof enclosures and be ground fault protected.

D. In leased spaces, arrangements for water supplies and electricity must be made with the landlord. However, all such arrangements must be made through and are subject to approval of the Department of Design and Construction. Utilities will be provided at no cost to the asbestos abatement contractor. However, it is the asbestos abatement contractor's (or the General Contractor's) responsibility to furnish and install a suitable distribution system to the Work Area. This system will be provided at no cost to the City.

1.15 FEES

The asbestos abatement contractor shall be responsible for any and all fees or charges imposed by Local, State or Federal Law, Rule and Regulation applicable to the work specified herein, including fees or charges which may be imposed subsequent to the date of the Bid opening.

END OF SECTION

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Concrete standards.
2. Concrete materials.
3. Admixtures.
4. Fiber reinforcement.
5. Vapor retarders.
6. Floor and slab treatments.
7. Liquid floor treatments.
8. Curing materials.
9. Accessories.
10. Repair materials.
11. Concrete mixture materials.
12. Concrete mixture class types.
13. Concrete mixing.

B. Section applies to:

1. Foundation systems including grade beams and pile caps.
2. Structural slabs on grade.
3. Structural slabs on metal deck.
4. Topping slabs.
5. Stair pan infills.
6. Site concrete consisting of curbs, walls, and pads.
7. Shrinkage-resistant grout for column base plates.

C. Related Requirements:

1. Section 033543 "Polished Concrete Finishing" for concrete floors scheduled to receive a polished concrete finish.
2. Section 071326 "Self-Adhering Sheet Waterproofing" for blind side waterproofing.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement or blended hydraulic cement alone or in combination with one or more of the following:

1. Fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cementitious Materials (w/cm) Ratio: The ratio by weight of mixing water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site, or other agreed-upon location. Meeting must be at least 35 days prior to the start of the concrete construction schedule.

1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for inspections and acceptance testing of concrete at Project site.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.
e. Special concrete finish Subcontractor.
f. Commissioner.
g. Waterproofing Subcontractor.
h. Concrete Polishing Subcontractor.
i. City of New York.

2. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction joints, control joints, isolation joints, and joint-filler strips.
c. Waterproofing Installation.
d. Anchor rod and anchorage device installation tolerances.
e. Cold- and hot-weather concreting procedures.
f. Concrete finishes and finishing.
g. Curing procedures.
h. Methods for achieving specified floor and slab flatness and levelness.
i. Floor and slab flatness and levelness measurements.
j. Concrete repair procedures.
k. Concrete protection.
l. Initial curing of standard-cured and field curing of field-cured test cylinders (ASTM C31/C31M.)
m. Protection of field cured field test cylinders.

3. Minutes will be recorded, typed and printed by the contractor and distributed by the contractor to all parties concerned within 5 days of the meeting. One copy of the minutes will also be transmitted to the Commissioner.

4. The minutes must include a statement by the concrete contractor indicating that the proposed mix design and placing can produce the concrete quality required by these specifications.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data:

1. Portland cement.
2. Blended hydraulic cement.
3. Performance-based hydraulic cement.
4. Fly ash.
5. Slag cement.
6. Silica fume.
7. Aggregates.
8. Admixtures:

    a. Include limitations of use. Admixtures that do not comply with reference ASTM International requirements must be submitted with test data for approval.
9. Fiber reinforcement.
10. Floor and slab treatments.
11. Curing materials.

    a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment manufacturer.

12. Reinforcement.
13. Supports for reinforcement.
14. Waterstops.
15. Shrinkage-resistant grout.
16. Corrective work materials.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
3. Laboratory Test Reports: For , indicating compliance with requirements for low-emitting materials.

C. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Compressive strength at 28 days or other age as specified.
3. Compressive strength required at stages of construction.
4. Durability exposure classes for Exposure Categories F, S, W, and C.
5. Maximum w/cm ratio.

6. Calculated equilibrium and fresh density for lightweight concrete.
7. Slump or slump flow limit.
8. Air content.
9. Nominal maximum aggregate size.
10. Synthetic macrofiber content.
11. Intended placement method.
12. Submit adjustments to design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant changes.

D. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

   a. Location of construction joints, pour joints and saw-cut joints at exposed slabs are subject to approval of the Commissioner.

2. Dimensional Layout: Indicate all steps, slab edges, beam and wall locations, and elevations.
3. Reinforcement Layout: Submit original shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Details and Detailing of Concrete Reinforcement" showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures. The shop drawings must be prepared only by competent detailers, checked by the contractor prior to submission.

   a. Obtain and coordinate information for sleeves and openings in concrete, which are required for the work of other trades. Make coordinated drawings showing size and location of openings and sleeves and incorporate this information on the reinforcing drawings.
   b. Only those splices indicated on the approved shop drawings will be permitted.

E. Cold and Hot Weather Concreting Procedures: Submit written descriptions of contractor’s proposed cold weather and hot weather concreting procedures, when applicable.

F. Samples: finish slab samples 12x12 min, (1) for each level of sheen and each type of finish specified in section 033543 for concrete polishing.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following:

1. Cementitious materials.
2. Reinforcing materials.
3. Admixtures.
4. Fiber reinforcement.
5. Curing compounds.
6. Floor and slab treatments.
7. Bonding agents.
8. Adhesives.

9. Joint-filler strips.
10. Repair materials.

C. Material Test Reports: For the following:

1. Portland cement.
2. Blended hydraulic cement.
3. Performance-based hydraulic cement.
4. Fly ash.
5. Slag cement.
6. Silica fume.
7. Aggregates.
8. Admixtures.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/1, and who employs a) project personnel qualified as an ACI-certified Concrete Flatwork Associate and Concrete Flatwork Finisher, and b) a supervisor who is a certified ACI Advanced Concrete Flatwork Finisher/Technician or an ACI Concrete Flatwork Finisher.

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

C. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment, and that is approved by NYC DDC Quality Assurance Unit.

D. Mockups: slab-on-ground to demonstrate typical joints, surface finish, texture, tolerance, floor treatments, and standard of workmanship.

1. Mock-up must consist of the following:

a. Scope of Slab Mock-ups: Place 15 feet by 15 feet by thickness shown on drawings, slab using approved concrete mix at Project in location approved by Commissioner.

1) Include construction joint and sawcut crack control joint, dividing square into quarters.
2) Machine finish to uniform float surface and finish each half with different finish as selected by commissioner in samples, effect as approved by commissioner.
3) Apply hardener/densifier, followed by specified sealer protective treatment to one half of mockup according to the manufacturer’s instructions.
4) Color admixture.

b. Reinforce as in a similar detail on the drawings and add necessary reinforcing and/or supports to maintain stability.

c. Use approved form face materials, reinforcement and accessories and assemble formwork as intended for the building construction
d. Place concrete in the slab with methods to be used for typical slab in project, including anticipated time delays between deposit lifts.
e. Finish exposed hardened surfaces with specified finish treatments when directed by the commissioner and with the commissioner present. Finish with minimum 2 feet wide areas as directed by the commissioner.
f. Use same concrete mix design for the mock-up as will be used in the construction of the final slab.

2. If mock-ups are not approved by the commissioner, remove, and replace with others at no additional cost to the City of New York.
3. Mock-ups must be located so they will remain throughout construction. Protect mock-up from damage during construction. Remove mock-up when directed by the Commissioner.

1.9 PRECONSTRUCTION TESTING

A. TR3 (Technical Report for Concrete Design Mix): Contractor will be responsible for, and bear all costs associated with the filing and securing of approvals, if any, for Form TR3: Technical Report Concrete Design Mix, including, but not limited to, engaging the services of a New York City licensed Concrete Testing Lab for the review and approval of concrete design mix, testing, signatures and professional seals, etc., compliant with NYC Department of Buildings requirements, for each concrete design mix.

1. Include the following information in each test report:

a. Admixture dosage rates.
b. Slump.
c. Air content.
d. Seven-day compressive strength.
e. 28-day compressive strength.
f. Evaluation of permeability-reducing admixtures.
g. Concrete density.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

B. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

C. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

1.11 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 as follows:

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When air temperature has fallen to, or is expected to fall below 40 deg F during the protection period, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.12 PROJECT CONDITIONS

A. The Contractor, before commencing work, must examine all adjoining work on which this work is in any way dependent for proper installation and workmanship according to the intent of this specification, and will report to the Commissioner any condition which prevents this contractor from performing first class work.

B. Protection of Footings Against Freezing: Cover completed work at footing level with sufficient temporary or permanent cover as required to protect footings and adjacent subgrade against possibility of freezing; maintain cover for time period as necessary.

C. Protect adjacent finish materials against spatter during concrete placement.

D. Provide all barricades and safeguards at all pits, holes, shaft and stairway openings, etc., to prevent injury to workmen and others within and about the premises. Also, provide all safeguards as required by the Building Code and OSHA. Take full responsibility for all safety precautions and methods.

1.13 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE STANDARDS

A. ACI Publications: Comply with ACI 301 (ACI 301M) unless modified by requirements in the Contract Documents.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615/A 615 M, Grade 60 (Grade 420).

B. Weldable Reinforcing Bars: ASTM A 706/A 706M, Grade 60 (Grade 420).

C. Epoxy-Coated Reinforcing bars: ASTM A775.

D. Steel Wire and Welded Wire Reinforcement: ASTM A 1064.

E. Supports for Reinforcement: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire reinforcement in place. Use wire bar type supports complying with CRSI specifications.

1. For epoxy-coated bars, provide plastic protected chairs and plastic ties. All imperfections in the epoxy coating are to be repaired prior to placement of concrete.

2.3 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type of admixture from single source from single manufacturer.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I or Type II, .
2. Fly Ash: ASTM C618, Class C or F.
3. Performance-Based Hydraulic Cement: ASTM C1157/C1157M
4. Slag Cement: ASTM C989/C989M, Grade 100 or 120.

C. Normal-Weight Aggregates:

1. Maximum Coarse-Aggregate Size: 57 for foundations and 67 for slabs.
2. Fine Aggregate: Washed, inert, natural or manufactured sand, conforming to ASTM C33 gradation. Free of materials with deleterious reactivity to alkali in cement.

D. Lightweight Aggregate: ASTM C330/C330M, 3/8-inch nominal maximum aggregate size. Well-graded crused expanded shale produced by rotary kiln method.

2.4 ADMIXTURES

A. Air-Entraining Admixture: ASTM C260/C260M.

1. Air entraining admixture is not to be used in concrete to receive hard trowel finish.

B. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.

2.5 FIBER REINFORCEMENT

A. Synthetic Macrofiber: Synthetic macrofibers complying with ASTM C1116/C1116M, Type III, 1 to 2-1/4 inches long.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Euclid Chemical Company (The); a subsidiary of RPM International, Inc.
b. GCP Applied Technologies Inc.
c. Propex Operating Company, LLC.
d. Sika Corporation.
e. Or approved equal.

2.6 SHRINKAGE-RESISTANT GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 FLOOR AND SLAB TREATMENTS

A. Concrete Cleaning Solution: must be a commercial concrete cleaner containing solvents, chloride acids and stain removers, with no more than 1.5 percent acid content. Solutions must be as follows:

1. Cleaning applications may or may not be required. Determination will be made by the on review of respective finish surfaces. Cleaning materials must be tested on tombstones and mockups as directed by the Commissioner.
2. Product: Subject to compliance with requirements, provide one of the following:

a. PROSOCO, Inc.; Enviro Klean 2010 All Surface Cleaner.
b. PROSOCO, Inc.; Sure Klean Light Duty Concrete Cleaner.
c. PROSOCO, Inc.; Sure Klean Heavy Duty Concrete Cleaner.
d. Zep; Driveway Concrete Cleaner.
e. EnviroChem; Concrete Cleaner.
f. Or approved equal.

B. Concrete stain removers must be as follows:

1. Rust stains:

    a. Product: Subject to compliance with requirements, provide one of the following:

        1) PROSOCO, Inc.; Sure Klean T-1087 Special Poultice Additive.
        2) PROSOCO, Inc.; Sure Klean T-1047 Iron Stain Remover.
        3) Zep; Rust Stain Remover.
        4) Dumond Chemicals, Inc.; Smart Strip.
        5) Or approved equal.

2. Calcium Stains:

    a. Product: Subject to compliance with requirements, provide one of the following:

        1) PROSOCO, Inc.; Sure Klean 942 Limestone & Marble Cleaner.
        2) PROSOCO, Inc.; Consolideck PreKlean.
        3) Zep; Calcium, Lime & Rust Stain Remover.
        4) Dumond Chemicals, Inc.; Stone & Masonry Cleaner
        5) Or approved equal.

C. Concrete Etching Material:

1. Product: Subject to compliance with requirements, provide one of the following:

    a. PROSOCO, Inc.; SafEtch.
    b. Surecrete; SCR.
    c. Clemons Concrete Coatings; Etch & Clean.
    d. Or approved equal.

D. Water and Oil Repellent Sealer: Provide water and oil repellent sealer to all Cast-in-Place Concrete Paving surfaces exposed to view, and to walls when selected in mockup.

1. Low molecular, minimum 95 percent solid, Clear, Oleophobic, Silane sealer;
2. Product: Subject to compliance with requirements, provide one of the following:

    a. PROSOCO, Inc.; SLX100.
    b. Sika Group; Sikagard - 675 W.
    c. Guard Industry; Wet Look Sealer.
    d. Or approved equal.

E. Densifier: Penetrating Lithium-Silicate hardener and densifier;

1. Product: Subject to compliance with requirements, provide one of the following:

    a. PROSOCO, Inc; Consolideck LS/CS.
    b. Euclid Chemical; Euco Hard.
    c. Sika Group; CureHard.
    d. Or approved equal.

F. Slab Perimeter Filler: 1/8 inch thick by slab depth, dense neoprene with tear strip at perimeter;

1. Product: Subject to compliance with requirements, provide one of the following:

    a. Hohmann and Barnard; Blok-Lok NSTA Neoprene Sponge.
    b. Wire-Bond; Expansion Joint.
    c. Frost King; Rubber Foam Weatherseal.
    d. Or approved equal.

2.8 CURING MATERIALS

A. Curing Material for Flat Surfaces: Provide one of the following:

1. Misting nozzle for water spray. must produce a fine mist that settles slowly onto the surface of the concrete. A sprinkle nozzle that emits streams of water is not acceptable.
2. Moisture Curing Cover: Specially manufactured composite fabric designed to maintain 100 percent humidity at the concrete surface without marring or altering the concrete finish.

    a. Product: Subject to compliance with requirements, provide one of the following:

        1) PNA Construction Technologies
        2) McTechGroup; UltraCure NCF.
        3) Sika Group; UltraCure blankets
        4) Or approved equal.

3. Curing Material/Evaporation Retarders: VOC compliant, colorless, diffusive, blend of Sodium, Potassium and Meta Silicate and be able to retain water in concrete with minimal loss during high temperatures and without rapid loss of moisture. must not contain wax, resin or acid.

    a. Product: Subject to compliance with requirements, provide one of the following:

        1) L&M Construction Chemicals, Inc.; L&M Cure.
        2) W.R. Meadows, Inc.; SealTight Med-Cure.
        3) Sika Group; Sikafilm
        4) Or approved equal.

2.9 ACCESSORIES

A. Waterstop for Vertical and Horizontal Construction Joints: Engineered, swellable, conformable, synthetic waterstop strip that expands when in contact with water, Foundation Waterproofing at foundation areas.

1. Product: Subject to compliance with requirements, provide one of the following:

    a. GCP Applied Technologies; ADCOR ES.
    b. Sika Group; Greenstreak Waterstop
    c. Tremco; Superstop
    d. Or approved equal.

B. Saw cutting Material for Crack Control Joints: must be equipment specifically designed for cutting crisp edges in newly cast concrete (less than 10 hours old). The cutting machine should be a high-speed type (10,000 rpm min), self-propelling without forcing the speed. The blade should be a blade especially made for the greenest concrete. Blades must be designed to cut 1/4 inch wide joints.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Soff-Cut Corporation
   b. USF Sawtec Corp.
   c. Baker Hughes.
   d. Or approved equal.

2. Sawcut for construction joints to match sawn crack control joints, use appropriate blade by same manufacturers.

C. Bonding Agent:

1. Product: Subject to compliance with requirements, provide one of the following:

   a. Euclid Chemical Company; SBR Latex.
   b. W.R. Grace; Daraweld C.
   c. Larsen Products Corporation; Weldcrete.
   d. Or approved equal.

D. Compressible Filler: Urethane or polyethylene foam, moisture insensitive, non-absorbent, manufactured for use as expansion joint in concrete, of suitable density for intended use.

1. Product: Subject to compliance with requirements, provide one of the following:

   a. Williams; Everlastic 1300.
   b. Sika Group; Sika Expansion Joint Sealants.
   c. Sonneborn; Sonneborn 150.
   d. Or approved equal.

E. Masking Materials: Plywood, metal, rubber, armored tape or other suitable non-staining or marring materials. Masking must leave a clean, crisp, true edge after blasting and removal of masking. Anchors, tapes, and adhesives must leave no residue or change in color, shade, marks or texture in finish surfaces.

F. Temporary Slab Protection System

1. Heavy duty, double layer system specifically designed for protection of concrete, masonry, stone, and tile floors, and capable of withstanding construction traffic, machinery, spills, staining, and exterior conditions up to 9 months.
2. Protection system must be UV, mold, rust, impact and fire resistant, and consist of a roller or spray applied base coat and a fabric overlay, creating a monolithic protection membrane that peels up as a unit when work is completed.
3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Skudo USA.
   b. Surface Shield.

c. Ram Board.
d. Sika Group.
e. Or approved equal.

G. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

H. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

I. Epoxy Bonding Adhesive: ASTM C881/C881M, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.10 CORRECTIVE WORK MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109/C109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109/C109M.

2.11 CONCRETE MIXTURE MATERIALS

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland or hydraulic cement in concrete assigned to Exposure Class F3 as follows:

1. Fly Ash or Other Pozzolans: 25 percent by mass.
2. Slag Cement: 50 percent by mass.
3. Total of Fly Ash or Other Pozzolans, and Slag Cement: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
4. Total of Fly Ash or Other Pozzolans: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, and concrete with a w/cm below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
5. Use permeability-reducing admixture in concrete mixtures where indicated.

2.12 CONCRETE MIXTURE CLASS TYPES

A. See construction documents for concrete mix design requirements for typical structural elements. Concrete mix properties must be the strictest of what is required per construction documents and specifications.

B. Class A: Normal-weight concrete used for footings, grade beams, slab on grade and pile caps.

1. Exposure Class: ACI 318 Class F0 Class F1
2. Minimum Compressive Strength: 5000 psi at 28 days.
3. Maximum w/cm Ratio: 0.40.
4. Slump Limit:

   a. For conventional concrete: Not less than 1 inch and not more than 3 inches, for conventional concrete
   b. For concrete containing a High-Range-Water-Reducing admixture. Not more than 9 inches. The concrete must arrive to the jobsite at a slump of 2 inches to 3 inches, be verified, then the HRWR admixture will be added to increase the slump to the approved level.

5. Air Content:

   a. Exposure Class F1: 5.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size.

6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cementitious materials.

C. Class B: Structural lightweight concrete used for topping slabs.

1. Exposure Class: ACI 318 Class F0 .
2. Minimum Compressive Strength: 4000 psi at 28 days.
3. Slump Limit: 4 inches, plus or minus 1 inch for concrete .
4. Air Content:

a. Total air content must not to exceed 3 percent for concrete used in trowel-finished floors.

5. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Class C: Normal-weight concrete used for interior stairs and landings:

1. Exposure Class: ACI 318 Class F0 Class F1.
2. Minimum Compressive Strength: 5000 psi at 28 days.
3. Maximum w/cm Ratio: 0.40.
4. Slump Limit: 3 inches, or minus 2 inches.
5. Air Content: 3 percent, plus or minus 1.0 percent at point of delivery.
6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

2.13 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and furnish delivery ticket.

B. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, and quantity.

C. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required. When air temperature is between 85°F (30°C) and 90°F (32°C), reduce maximum mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90°F (32°C), reduce maximum mixing and delivery time to 60 minutes.

D. For concrete containing HRWR admixture, no water is permitted to be added after mixing. If loss of slump occurs, the concrete treated with HRWR may be redosed as long as a "flash set" has not occurred. Redosage procedures must be discussed and approved by the Commissioner and the manufacturer

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.3 GENERAL

A. Fly Ash Concrete & Slag Concrete: Concrete mixes containing high volumes of fly ash or Slag have slower set times and may take up to 56 days to reach full strength. Additional cylinders should be taken by the testing agency to allow for additional strength tests.

3.4 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.5 TOLERANCES

A. Comply with ACI 117.

3.6 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. Install reglets to receive waterproofing and through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.7 INSTALLATION OF CAST-IN-PLACE CONCRETE

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair and restore defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Commissioner and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Ready-mix concrete must comply with the requirements of ASTM C 94 and ACI 304. All plant and transporting equipment must comply with the concrete plant standards and truck mixer and agitator standards of the National Ready Mix Concrete Association.

D. Pre-placement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other trades to permit installation of their work; cooperate with other trades in setting such work.

E. Water addition in transit or at the Project site must be in accordance with ASTM C94/C94M and must not exceed the permitted amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

G. Bring slab surfaces to correct level with straightedge and strikeoff. Use highway straightedge, bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

1. Reinforcement

a. Reinforce slabs with specified micro-fibers integrally mixed into the concrete. Steel fabric or rebar must be as shown on Drawings and specified.

2. Cleaning: Clean all surfaces free of foreign material and debris. Protect cleaned surfaces if placing does not commence immediately. Cover area with tarpaulins if open to wind and debris.

3. Treatment at Base of Columns and Walls: Apply a layer of 1/8” thick neoprene filler material to the base of all columns and walls to isolate the column and walls from the concrete. The top of the filler strip must be set to the finish floor line elevation, and upper tear-away strip removed following curing leaving 1/4-inch- deep recess.

H. Maintain reinforcing in proper position during concrete placement operations.

I. Edge condition:

1. Finish the edge of the concrete square to the top of the formwork stop or filler strip without edge tooling or as specifically directed by the commissioner.

2. Where construction joints in the slab are shown on the architectural drawings proceed as follows:

    a. Securely fasten the bulkhead to maintain alignment in a straight line during the placement of the concrete.
    b. Do not tool edge. Finish edge square.
    c. Remove the bulkhead form first placement to place the adjacent concrete.
    d. At the second placement finish flush with the in-place placement without over troweling.
    e. Joints to be sawcut over as final treatment if saw cuts are shown on the architectural drawings.

3. At the perimeter of placements, except at mid slab construction joints, place the specified joint filler against the interfacing surface. Align with the top of the finished slab.

J. Cleaning: clean all surfaces free of foreign material and debris.

K. Keep traffic off floor or slab as recommended by manufacturer of curing material. If floors are to be used during construction protect floor or slab from damage. See Protection herein for other requirements.

L. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

1. When air temperature has fallen to or is expected to fall below 40°F (4°C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F (10°C), and not more than 80°F (27°C) at point of placement.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Use only a non-corrosive, non-chloride accelerator. Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions are not permitted.
4. Care must be taken to store water-based curing and sealing compounds where they will not freeze. In most cases, they cannot be reconstituted after thawing.

M. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F (32°C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
3. Fog spray forms, reinforcing steel and subgrade just before concrete is placed.

3.8 INSTALLATION OF JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete. Install a formwork bulkhead at all construction joints. Construction joints, if required, must be located at a sawcut line in the topping slab.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence. Install construction joints true to line, with faces perpendicular to surface plane of cast-in-place architectural concrete, so strength and appearance of concrete are not impaired, at locations indicated or as approved by Commissioner.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Commissioner.
2. Place joints perpendicular to main reinforcement.

   a. Continue reinforcement across construction joints unless otherwise indicated.
   b. Do not continue reinforcement through sides of strip placements of floors and slabs.

3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
4. Locate joints for beams and slabs
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

D. Contraction Joints: Form weakened-plane contraction joints true to line, with faces perpendicular to surface plane of cast-in-place architectural concrete, so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by commissioner.

E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.9 REINFORCEMENT PLACEMENT

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials, which reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

D. Place reinforcement to obtain at least minimum coverage's for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.10 FORMWORK

A. Forming for Concrete Paving: Conform to the requirements of Section 033000 Cast-in-Place Concrete, as it relates to Class A Finish Work.

B. Form Erection:

1. Paving Form Surfacee cus:

a. Install sealant in all fabricated butt joints of plastic overlay form panels to prevent fluid loss.
b. Construction joints in concrete paving slab must be located only where shown on the architectural Drawings as control joints. Construction joints and slab perimeters must have a bulkhead that is straight and level. Back-up all splices. Seal all splices with sealant. Splice top surfaces must be level and consistent with no offsets. Construction joints must be maintained straight and must be performed to be sawcut over as control joints in a subsequent procedure. Use rigid, screw adjustable bracing to maintain bulkhead lines straight and level. Provide a hold-down system to maintain level bulkhead top.

1) Bulkhead for first placement must be straight and the top must be level. Second placement must be finished flush and even to the in-place concrete with no over troweling of mortar.

c. Slab perimeters must have a bulkhead that is straight and level. Back-up all splices. Seal all splices with sealant. Splice top surfaces must be level and consistent with no offsets. Slab perimeters must be maintained straight, use rigid, screw adjustable bracing to maintain bulkhead lines straight and level. Provide a hold-down system to maintain level bulkhead top. Metal perimeter slab terminations may serve as bulkhead where suitable and can achieve the required tolerance for straightness, levelness, and alignment.

2. Paving Construction Joints:

a. See Form Erection.
b. Finish the edge of the concrete square to the top of the bulkhead without tooling. Hand finish edge with pressure prior to machine to attain dense at the edge.
c. Remove the bulkhead form prior to placing the adjacent concrete.

d. At the second placement finish flush with the in-place placement without over troweling. Joints to be sawcut as final treatment
e. At the perimeter of placements, except at mid slab construction joints, place the specified joint filler against the interfacing surface. Align with the top of the finished slab or as detailed in architectural's drawings.

3. Formwork Tolerance:

a. Finish Lines: Paving slabs for this project require extra care to maintain tolerances. Slab edges, construction joints and control joints tightly abut mechanical system cabinets, embedded items, columns, and other elements that are manufactured to highly controlled tolerances. The concrete slab lines and edges must exhibit uniform joints and parallel surfaces relative to the adjacent fabrications. Fabricate, position and support formwork surfaces to maintain hardened concrete finish lines within the following allowable variations:

1) From designed vertical plane in 10 feet: plus 1/8 inch, minus 0 inches.
2) Smooth form surface to surface at butt joint: Maximum variation of 1/4" panel thickness – fabricate panel edges tight to back-up member.
3) It is the intent of this specification that the formwork will be erected in such a manner that lines and surfaces are visually presentable without obvious defects. Where lines and planes require adjusting from one placement to another adjust the forms to realign in a visually acceptable manner.

b. Slab surfaces:

1) Bulkhead form for construction joints:

a) Variation from elevation: plus 1/8 inch, minus 0 inches.
b) From designed plane in 10 feet: plus 1/8 inch, minus 0 inches.

2) Flatness of concrete paving surfaces: FF-30

3.11 APPLICATION OF FINISHING FLOORS AND SLABS

A. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish as indicated on drawings.

B. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface. Use of an approved finishing aid is acceptable.

5. Do not apply troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:

    a. Slabs at Grade:

        1) Finish and measure according to ASTM E1155
        2) Specified overall values of flatness, FF 25; and of levelness, FL 20; with minimum local values of flatness, FF 17; and of levelness, FL 15.

C. Trowel and Fine-Broom Finish: First apply a trowel finish to surfaces indicated on Drawings. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Commissioner before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations as indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with a fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Commissioner before application.

E. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces in accordance with manufacturer's written instructions and as follows:

1. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ft. unless greater amount is recommended by manufacturer.
2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating.
3. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
4. After final floating, apply a trowel finish.
5. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

F. Form-Liner Finish: Produce a textured surface free of pockets, streaks, and honeycombs, and of uniform appearance, color, and texture.

G. Slab, Stair And Ramp Paving Surfaces

1. Placing and Wet Finishing

    a. The concrete must be placed, compacted, struck off and leveled.
    b. Surfaces must be bull floated to the designated elevation and to achieve specified.

2. Saw Cutting

a. Within 16 hours after casting saw cutting of the designated crack control joints must be completed. Non-crack control joints and construction joints must be completed as soon as possible after the crack control joints are completed.
b. Layout joint lines as shown on the drawings provided by the commissioner. Use white, non-staining, chalk. Colored chalk is not acceptable.
c. The width of the joints must be 1/4 inch and the depth of cut must be 1/4 of the slab thickness at crack control joints and 1/4 inch deep for non-crack control cuts.
d. Install hard filler in joint when cross cutting across a previously cut joint.
e. Sawcut over the construction joints replacing the construction joint line with a sawcut joint.
f. Immediately after completion of the saw cutting an area, clean the cutting material from the surface. Where shrinkage reduction admixture used install the approved curing felt backed cover. Lap joints and butt tightly to wall and vertical interfacing surfaces. Allow the cover to remain in place for seven days. Permit no traffic or items bearing on concrete surface.

3. Ground Surfaces:

a. After concrete surfaces have been cast and troweled to hard steel trowel finish, and after the concrete is 14 days or older grind the concrete surface. Verify that surface is true to line, level and ready to be ground.
b. Apply protection at any finished surface adjacent to the stair surface to be ground.

H. Densifier: All Concrete Paving Surfaces.

1. Thoroughly clean and dry surfaces.
2. Apply specified densifier to all exposed surfaces in accordance with manufacturer’s written instructions. Allow to cure.

I. Water and Oil Repellent Sealing Concrete Surfaces: All concrete paving.

1. Inspect concrete paving for stains, deposits, spills, drips, or other damage. Repair and clean to uniform presentation as approved by commissioner in samples and mockups. Use cleaning materials, and methods specified herein.

2. Immediately after cleaning, and once materials have dried sufficiently surface apply the specified sealer to all exposed surfaces.

3. Apply in conformance with sealer manufacturer’s recommendations; minimum of one wet coat, assure complete coverage and saturation of concrete surfaces.

4. Air cure the sealer for 24 hours prior to any use. Where construction work to be performed on paving install protection for workmen to continue working on top of surface.

J. Comply with Section 033543 "Polished Concrete Finishing".

3.12 APPLICATION OF FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.

a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
b. Remove projections larger than 1 inch.
c. Tie holes do not require patching.
d. Surface Tolerance: ACI 117, Class D.
e. Apply to concrete surfaces for metal lap pan deck formed surfaces and those surfaces that are buried or covered with subsequent installed surfaces.

2. ACI 301 Surface Finish SF-3.0:

a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
b. Remove projections larger than 1/8 inch.
c. Surface Tolerance: ACI 117 Class A.
d. Locations: Apply to concrete surfaces exposed to public view,.

B. Rubbed Finish: Apply the following to as-cast surface finishes where indicated on Drawings:

1. Smooth-Rubbed Finish:

a. Perform no later than one day after form removal.
b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.
d. Maintain required patterns or variances as shown on Drawings or to match mockups.

C. Patching: Only areas designated by the commissioner must be patched. Where minor patching is required as approved by the commissioner as a means of rendering the surface acceptable, it must consist of patching with a texture matching technique and color matching mortar mix. Test patches must be placed on the mock-up or other approved surface and be approved by the commissioner prior to commencing any patching of the work.

3.13 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling in:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to match color and texture with in-place construction exposed to view.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases as indicated on the Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.

3. Minimum Compressive Strength: 5000 psi at 28 days.
4. For supported equipment, install required anchor bolts that extend through concrete base and anchor into structural concrete substrate.
5. Prior to pouring concrete, place and secure anchorage devices.

    a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    b. Cast anchor-bolt insert into bases.
    c. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.

1. Cast-in inserts and accessories, as shown on Drawings.
2. Screed, tamp, and trowel finish concrete surfaces.

3.14 APPLICATION OF CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h, before and during finishing operations.

B. Curing of horizontal surfaces.

1. Mist (mist spray nozzle, not sprinkling) surfaces. Start misting immediately after leveling and continue during and after finishing an area. Mist surfaces to prevent any moisture loss from the surface of the concrete. Surfaces should be kept moist without any water puddling and no areas should be allowed to dry. Continue misting operation until specified curing compound is applied.

2. Apply the specified curing material according to manufacturer’s written instructions. Do not over-apply.

3. Where shrinkage reduction admixture used in concrete cure concrete in conformance with shrinkage reduction manufacturer’s written recommendations.

4. Keep traffic off paving during curing as recommended by manufacturer of curing material.

C. Curing Formed Surfaces: Comply with ACI 308.1 as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period using one of the following method:

    a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
    b. Continuous Sprinkling: Maintain concrete surface continuously wet.

c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

1) Recoat areas subject to heavy rainfall within three hours after initial application.
2) Maintain continuity of coating and repair damage during curing period.

D. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Begin curing after finishing concrete.
2. Interior Concrete Floors:

a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following not in cold weather:

a) Water.
b) Continuous water-fog spray.

b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

c. Floors to Receive Polished Finish: Comply with Section 033543 "Polished Concrete Finishing". Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

d. Floors To Receive Chemical Stain:

1) As soon as concrete has sufficient set to permit application without marring concrete surface, install curing paper over entire area of floor.
2) Install curing paper square to building lines, without wrinkles, and in a single length without end joints.
3) Butt sides of curing paper tight; do not overlap sides of curing paper.
4) Leave curing paper in place for duration of curing period, but not less than 28 days.

e. Floors To Receive Urethane Flooring:

1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
2) Rewet absorptive cover, and cover immediately with polyethylene moisture-retaining cover with edges lapped 6 inches and sealed in place.
3) Secure polyethylene moisture-retaining cover in place to prohibit air from circulating under polyethylene moisture-retaining cover.
4) Leave absorptive cover and polyethylene moisture-retaining cover in place for duration of curing period, but not less than 28 days.

f. Floors To Receive Curing Compound:

1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Maintain continuity of coating, and repair damage during curing period.
4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

g. Floors To Receive Curing and Sealing Compound:

1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.15 INSTALLATION OF JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.16 INSTALLATION OF CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by Commissioner.
2. Remove and replace concrete that cannot be repaired and patched to meet specification requirements.

B. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks in excess of 0.01 inch spalls, air bubbles exceeding surface finish limits, honeycombs, rock pockets, fins and other projections on the surface exceeding surface finish limits, and stains and other discolorations that cannot be removed by cleaning.

1. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
2. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance, as determined by Commissioner.

C. Perform structural repairs of concrete, subject to Commissioner's approval, using epoxy adhesive and patching mortar.

3.17 FIELD QUALITY CONTROL

A. Special Inspections: City of New York will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports per requirements of Chapter 17 of the NYC Building Code.

1. Concrete - Cast-in-Place (BC 1704.4)
2. Concrete Design Mix - TR3 (BC 1905.3, BC 1913.5). (See Article 1.9.)
3. Concrete Sampling and Testing - TR2 (BC 1905.6, BC 1913.10)

B. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M to be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 150 cu. yd. or fraction thereof.

   a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing is to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   b. Consider obtaining additional compressive strength test samples if selected mix design exhibits properties of strength gain beyond 28 days.

2. Slump: ASTM C143/C143M:

   a. One test at point of delivery for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   b. Perform additional tests as needed.

3. Slump Flow: ASTM C1611/C1611M:

   a. One test at point of delivery for each composite sample when strength test specimens are cast, but not less than one test for each day's pour of each concrete mixture.
   b. Perform additional tests as needed.

4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete; ASTM C173/C173M volumetric method, for structural lightweight concrete.

   a. One test for each composite sample when strength test specimens are cast, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C1064/C1064M:

   a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample when strength test specimens are cast.

6. Concrete Density: ASTM C138/C138M:

   a. One test for each composite sample when strength test specimens are cast.

7. Unit Weight: ASTM C138/C138M density of fresh structural lightweight concrete.

   a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture. The fresh density should be consistent with that associated with the equilibrium density within a tolerance of plus or minus 4 lb/ft.^{3}.

8. Compression Test Specimens: ASTM C31/C31M:

    a. Cast and standard cure two sets of three 6 inches by 12-inches or 4-inch by 8-inch cylindrical specimens for each composite sample.
    b. Cast, and field cure two sets of three standard cylindrical specimens for each composite sample.

9. Compressive-Strength Tests: ASTM C39/C39M.

    a. Test one set of three standard cured specimens at seven days and one set of two specimens at 28 days.
    b. Test one set of three field-cured specimens at seven days and one set of two specimens at 28 days.
    c. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

10. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
11. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests of standard cured cylinders equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Commissioner but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests:

    a. Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Commissioner.
    b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Commissioner.

        1) Acceptance criteria for concrete strength to be in accordance with ACI 301, Section 1.7.6.3.

14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

C. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 48 hours of completion of floor finishing and promptly report test results to Commissioner.

3.18 PROTECTION

A. All paving, and wall surfaces must be free of damage at the time of acceptance. This protection must assure protection from paint, oils, rust, stains, impact, or damage of any other kind. The best way to protect a slab is to keep traffic off it.

1. If workmen must work on the slab, protect the slab as follows:

   a. Conform to protection system manufacturer's recommendations.
   b. Ensure that concrete surface is ready to receive specified floor protection system, test pH, moisture content and temperature. Ensure that all densifiers, sealers, or other applied materials are cured and compatible with protection system.
   c. Do not apply if rain likely within 6 hours of application.
   d. Clean all surfaces to receive protection system, remove any materials that will contaminate or compromise the base coat.
   e. Clear the area of any traffic and prevent intrusion until system dry and capable of receiving traffic. Allow overnight drying prior to permitting equipment onto surface.
   f. Apply base coat by roller or spray to minimum of 10 mils wet thickness, and as required for the approved finish concrete texture. Roll-in fabric to wet base coat and back-roll to assure complete adhesion of the fabric to the base coat.
   g. Work up to edges and around items penetrating the concrete, protect as necessary. Lap fabric edges and trim fabric in conformance with manufacturer's recommendations. Leave no concrete surface that will be exposed to view unprotected, to assure uniform appearance when protection removed.
   h. Monitor protection system during construction, mop up spills quickly and patch any damaged or deteriorating areas.
   i. When necessary provide temporary 3/8 inch plywood overlay in areas where extremely heavy or severe loads will occur.
   j. Keep the protective covering in place until workmen are finished.
   k. Remove protection system by peeling up entire membrane, dispose of in conformance with all environmental regulations. Remove any residue or over spill in conformance with protection system manufacturer's recommendations.

2. Cover wall surfaces with a self-supporting stand-off panel system. Locate field shops in areas where operation will not damage exposed walls and floors.

END OF SECTION 033000

SECTION 033543 - POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Polished concrete finishing.
2. Concrete for polished concrete, including concrete materials, mixture design, placement procedures, initial finishing, and curing is specified in Section 033000 "Cast-in-Place Concrete."

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for concrete not designated as polished concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with polished concrete to attend, including the following:

   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Cast-in-place concrete subcontractor.
   e. Polished concrete finishing Subcontractor.

2. Review curing procedures, construction joints,concrete repair procedures, concrete finishing, and protection of polished concrete.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Laboratory Test Reports: For stains and liquid floor treatments, indicating compliance with requirements for low-emitting materials.

C. Polishing Schedule: Submit plan showing polished concrete surfaces and schedule of polishing operations for each area of polished concrete before start of polishing operations. Include locations of all joints, including construction joints.

D. Samples for Verification: For each type of exposed color.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Repair materials.
2. Liquid floor treatments.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/1.

C. Mockups: Before casting concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Commissioner.
2. Demonstrate curing, finishing, and protecting of polished concrete.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Scofield, a Business Unit of Sika Corporation; Scofield Formula One Lithium Densifier MP or comparable product by one of the following:

a. ARDEX Americas.
b. Euclid Chemical Company (The); an RPM company.
c. Laticrete International, Inc.
d. MAPEI Corporation.
e. Or approved equal.

2. Products must comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 POLISHING

A. Polish: Level 2: Low sheen, 400 grit, unless otherwise indicated or selected by Commissioner.

B. Apply polished concrete finish system to cured and prepared slabs to match accepted mockup.

1. Machine grind floor surfaces to receive polished finishes level and smooth .
2. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
3. Continue polishing with progressively finer-grit diamond polishing pads to gloss level indicated, matching approved mockup.
4. Control and dispose of waste products produced by grinding and polishing operations.
5. Neutralize and clean polished floor surfaces.

END OF SECTION 033543

SECTION 034100 - PRECAST STRUCTURAL CONCRETE WITH ARCHITECTURAL FINISH

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Precast structural concrete stair and reception desk panels.

B. Related Requirements:

1. Division 03: "Cast-in-Place Concrete", "Polished Concrete Finishing".
2. Division 05: "Structural Steel Framing", "Metal Fabrications", "Pipe and Tube Railings".
3. Division 06: “Glue Laminated and Cross-Laminated Construction”, “Rough Carpentry”, “Interior Finish Carpentry”
4. Division 07: “Joint Sealants”

1.3 SUSTAINABLE DESIGN REQUIREMENTS

A. The Contractor is to implement practices and procedures to meet the Project's Sustainable Design goals, which include achieving LEED V4 Gold. The Contractor must ensure that the requirements related to these goals, as defined in this Section and in Related Sections of the Contract Documents, are implemented. Substitutions, or other changes to the Work proposed by the Contractor or their Subcontractors, must not be allowed if such changes compromise the Project's Sustainable Design goals.

B. The Contractor is to efficiently use resources and energy while executing the Work of this Section. Resource efficient aspects to be considered in completing this Project include the use of techniques that minimize waste generation, reuse of construction materials on site where possible, and recycling of waste generated during the construction process.

C. Performance Requirements: The following criteria are required for the products included in this section

1. All reinforcing steel, steel anchors, welded wire fabric, and other steel items required by the work of this section must contain a minimum of 50% (combined) pre-consumer/post-consumer recycled content.
2. Adhesives, sealants, paints and coatings used for the work of this section must meet the Volatile Organic Compound (VOC) limits where applicable.

D. LEED Performance Requirements:

1. Certification of recycled content, sourcing of materials, and VOC content must be in accordance with the LEED Submittals requirements of this section.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 LEED SUBMITTALS

A. Submit LEED Certification items as follows:

1. LEED Materials Certification Form: For all installed products and materials of this Section, complete the “Environmental Materials Reporting Form”. Information to be supplied for this Form must include:

a. Cost breakdowns for materials included in the Contractor or sub-contractor's Work. Material cost does not include costs associated with labor and equipment.
b. The percentages (by weight) of pre-consumer and/or post-consumer recycled content in the supplied product(s).
c. Indication of whether the raw materials have been extracted, harvested or recovered, as well as the final product has been manufactured (location of final assembly).

B. VOC Reporting Form: For all installed products and materials of this Section, complete the “VOC Reporting Form”. Information to be supplied for this Form must include:

1. Provide generic name by means of product type or application of all field-applied interior adhesives, sealants, paints, and coatings in this Section.
2. Provide corresponding referenced standard limits.
3. Provide full name of supplied product(s) and vendor or manufacturer for each product in this Section.
4. For all field-applied interior adhesives, sealants, paints, and coatings in this Section, provide Volatile Organic Compound (VOC) content in grams/liter or lbs./gallon.

C. Letters of Certification: Provided by the manufacturer on the manufacturer's letterhead, verifying the amount of recycled content.

D. Product Cut Sheets: For all materials that meet the sustainable design performance criteria as per the LEED Performance Requirements of this section.

E. Material Safety Data Sheets (MSDS): For all applicable products. Applicable products include, but are not limited to, adhesives, sealants, paints, and coatings applied to the interior of the building. MSDS ust indicate the Volatile Organic Compound (VOC) content of products submitted. If an MSDS does not indicate VOC content, then product data sheets, manufacturer's literature, or certification letter indicating a product's VOC content can be submitted with the MSDS.

F. Assemble required LEED Submittal information into one (1) package for each Specification Section or sub-contractor. Incomplete or inaccurate LEED Submittals may be used as the basis for rejecting the submittal products or assemblies.

1.6 PERFORMANCE REQUIREMENTS

A. Engineering Services: Design precast structural concrete, including comprehensive engineering analysis by a qualified professional engineer licensed in the State of New York, using performance requirements and design criteria indicated.

B. Structural Performance: Precast structural concrete units and connections must withstand design loads indicated within limits and under conditions indicated.

1. Use Load Combinations per New York City Building Code 2022.
2. Design precast structural concrete framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of primary building structure, and other building movements. Maintain precast structural concrete deflections within limits of ACI 318 unless otherwise noted.

a. Thermal Movements: Allow for in-plane thermal movements resulting from annual ambient temperature changes of minus 10 to plus 110 deg F.

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each precast concrete mixture. Include compressive strength and, if required, water-absorption tests.

C. Shop Drawings:

1. Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
2. Indicate separate face and backup mixture locations and thicknesses.
3. Indicate type, size, and length of welded connections by AWS standard symbols.
4. Detail loose and cast-in hardware, lifting and erection inserts, connections, and joints.
5. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
6. Include and locate openings larger than 10 inches. Where additional structural support is required, include header design.
7. Indicate location of each precast structural concrete unit by same identification mark placed on panel.
8. Indicate relationship of precast structural concrete units to adjacent materials.
9. Indicate estimated camber for precast floor slabs with concrete toppings.
10. Bearing and sliding bearing support conditions.
11. Indicate shim sizes and grouting sequence.
12. If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
13. Coordinate stair details for railings attachment details and stair nosing inserts.

D. Samples:

1. For each type of finish indicated on exposed surfaces of precast structural concrete units with architectural finish, in sets of three, representative of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches.

E. Engineering Services Submittals: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

F. Provide handling procedures, erection sequences, and for special conditions provide temporary bracing and shoring plans.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and fabricator.

B. Welding certificates.

C. Material Certificates: For the following:

1. Cementitious materials.
2. Reinforcing materials and prestressing tendons.
3. Admixtures.
4. Bearing pads.
5. Structural-steel shapes and hollow structural sections.

D. Material Test Reports: For aggregates, by a qualified testing agency.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mock Up: Once finish sample is approved, provide mock up to include at least 3 treads, top detail, connection detail, and landing joint detail.

C. Fabricator Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/2, and who will provide engineering services for precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer licensed in the State of New York.

1. Designated as a PCI-certified plant as follows:

a. Group C, Category C1 - Precast Concrete Products (no prestressed reinforcement).

D. Installer Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/1, who is trained and approved by manufacturer, and who is qualified and designated by PCI's Certificate of Compliance, to erect Category S2 - Complex Structural Systems and who can produce an Erectors' Post Audit Declaration, according to PCI MNL 127, "PCI Erector's Manual - Standards and Guidelines for the Erection of Precast Concrete Products.".

E. Design Standards: Comply with ACI 318 and design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.

F. Quality-Control Standard: For manufacturing procedures, testing requirements, and quality-control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."

G. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

H. Preinstallation Conference: Conduct conference at Project site.

1.10 COORDINATION

A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation

B. Coordinate as required with electrical subcontractor to install embedded snow melting cables into exterior stairs and landings..

1.11 DELIVERY, STORAGE, AND HANDLING

A. Support units during shipment on nonstaining shock-absorbing material in same position as during storage.

B. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.

1. Store units with dunnage across full width of each bearing point unless otherwise indicated.
2. Place adequate dunnage of even thickness between each unit.
3. Place stored units so identification marks are clearly visible, and units can be inspected.

C. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.

D. Lift and support units only at designated points indicated on Shop Drawings.

PART 2 - PRODUCTS

2.1 PRECAST STRUCTURAL CONCRETE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Oldcastle.
2. High Concrete
3. BPDL

4. Universal Concrete Products Corp
5. Or approved equal.

2.2 MOLD MATERIALS

A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that provides continuous precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.

1. Mold-Release Agent: Commercially produced form-release agent that does not bond with, stain, or adversely affect precast concrete surfaces and does not impair subsequent surface or joint treatments of precast concrete.

2.3 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.

B. Epoxy-Coated Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed bars, ASTM A775/A775M poxy coated, with less than 2 percent damaged coating in each 12-inch bar length.

C. Plain-Steel Welded Wire Reinforcement: ASTM A185/A185M, or ASTM A 1064/A 1064M.

D. Epoxy-Coated-Steel Wire: ASTM A884/A884M, Class A coated,plain,flat sheet, Type 1 bendable coating.

E. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

2.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or Type III, gray, unless otherwise indicated.

B. Supplementary Cementitious Materials:

1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
2. Silica Fume: ASTM C1240, with optional chemical and physical requirement.

C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C33/C33M, with coarse aggregates complying with . Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.

D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.

E. Air-Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

1. Water-Reducing Admixtures: ASTM C494/C494M, Type A.

G. Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

2.5 STEEL CONNECTION MATERIALS

A. High-Strength, Low-Alloy Structural Steel: ASTM A572/A572M.

B. Carbon-Steel Bolts and Studs: ASTM A307, Grade A; carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A563/A563M; and flat, unhardened steel washers, ASTM F844.

C. High-Strength Bolts, Nuts, and Washers:

1. ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563/A563M heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

2. ASTM F3125/F3125M, Grade A490, Type 1, heavy-hex steel structural bolts; ASTM A563/A563M heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

D. Zinc-Coated Finish: For exterior steel itemsand items indicated for galvanizing, apply zinc coating by .

1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035B or SSPC-Paint 20.

E. Welding Electrodes: Comply with AWS standards.

F. Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install precast structural concrete units.

2.6 BEARING PADS

A. Provide one of the following bearing pads for precast structural concrete units as recommended by precast fabricator for application:

1. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 Shore, Type A durometer hardness, ASTM D2240; minimum tensile strength 2250 psi, ASTM D412.

2.7 GROUT MATERIALS

A. Nonmetallic, Nonshrink Grout: Packaged, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107/C1107M, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time. .

2.8 CONCRETE MIXTURES

A. Prepare design mixtures for each type of precast concrete required.

1. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
2. Limit use of fly ash to 20 percent replacement of portland cement by weight and ground granulated blast-furnace slag to 40 percent of portland cement by weight; metakaolin and silica fume to 10 percent of portland cement by weight.
3. Prepare design mixes to achieve close match of approved finish for the Cast In Place structural slab.

B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.

C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 116 when tested according to ASTM C1218/C1218M.

D. Normal-Weight Concrete Mixtures: Proportion full-depth mixture by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 6000 psi.
2. Maximum Water-Cementitious Materials Ratio: 0.45.

E. Water Absorption: For structural precast concrete with an architectural finish, limit water absorption to 6 percent by weight or 14 percent by volume, tested according to ASTM C642, except for boiling requirement.

F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.

G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

H. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.9 MOLD FABRICATION

A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.

B. Maintain molds to provide completed precast structural concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

2.10 FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.

C. Cast-in reglets, slots, holes, and other accessories in precast structural concrete units as indicated on the Contract Drawings.

D. Cast-in openings larger than 10 inches in any dimension. Do not drill or cut openings or prestressing strand without Commissioner's approval.

E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcement exceeds limits specified in ASTM A775/A775M, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
3. Place reinforcing steel and prestressing strand to maintain at least 3/4-inch minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.

F. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses and specified in-place loads.

G. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

H. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.

I. Thoroughly consolidate placed concrete by vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 116.

1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants." Ensure adequate bond between face and backup concrete, if used.

J. Comply with ACI 306.1 procedures for cold-weather concrete placement.

K. Comply with PCI MNL 116 procedures for hot- and cold-weather concrete placement.

L. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that does not show in finished structure.

M. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

N. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and meet Commissioner's approval.

2.11 FABRICATION TOLERANCES

A. Fabricate precast structural concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 116 product dimension tolerances as well as position tolerances for cast-in items.

2.12 FINISHES

A. Grade A Finish: Repair surface blemishes and fill air holes with the exception of air holes 1/16 inch in width or smaller, and form marks where the surface deviation is less than 1/16 inch. Float apply a neat cement-paste coating to exposed surfaces. Rub dried paste coat with burlap to remove loose particles. Discoloration at form joints is permitted. Grind smooth all form joints.

B. Screed or float finish unformed surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. Major imperfections, honeycombing, or defects are not permitted.

C. Smooth, steel trowel finish unformed surfaces. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.

D. Apply roughened surface finish according to ACI 318 to precast concrete units that receive concrete topping after installation.

E. Finish of the precast elements is intended to match CIP slab finish as follows:

1. Level 2 low sheen, 400grit
2. Class A Cream or Class B- Fine Aggregate

2.13 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate precast structural concrete fabricator's quality-control and testing methods.

1. Allow testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation.

B. Testing: Test and inspect precast structural concrete according to PCI MNL 116 requirements

1. Test and inspect self-consolidating concrete according to PCI TR-6.

C. Strength of precast structural concrete units is considered deficient if units fail to comply with ACI 318 requirements for concrete strength.

D. If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 requirements, employ a qualified testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C42/C42M.

1. A minimum of three representative cores must be taken from units of suspect strength, from locations directed by Commissioner.
2. Test cores in an air-dry condition or, if units are wet under service conditions, test cores after immersion in water in a wet condition.
3. Strength of concrete for each series of three cores is considered satisfactory if average compressive strength is equal to at least 85 percent of 28-day design compressive strength and no single core is less than 75 percent of 28-day design compressive strength.
4. Report test results in writing on same day that tests are performed, with copies to Commissioner, Contractor, and precast concrete fabricator. Test reports include the following:

a. Project identification name and number.
b. Date when tests were performed.
c. Name of precast concrete fabricator.
d. Name of concrete testing agency.
e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.

E. Patching: If core test results are satisfactory and precast structural concrete units comply with requirements, clean and dampen core holes and solidly fill with same precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.

F. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Commissioner's approval. Commissioner reserves the right to reject precast units that do not match approved samples, sample panels, and mockups. Replace unacceptable units with precast concrete units that comply with requirements.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, bearing surface tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Do not install precast concrete units until supporting, cast-in-place concrete has attained minimum allowable design compressive strength and until supporting steel or other structure is structurally ready to receive loads from precast concrete units.

3.3 INSTALLATION

A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.

B. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, shoring, and bracing as required to maintain position, stability, and alignment of units until permanent connections are complete.

1. Install temporary steel or plastic spacing shims or bearing pads as precast structural concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
3. Remove projecting lifting devices and use plastic patch caps or sand-cement grout to fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.

C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

1. Do not permit connections to disrupt continuity of roof flashing.

D. Field cutting of precast units is not permitted without approval of Commissioner.

E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.

F. Welding: Comply with applicable requirements in AWS D1.1/D1.1M and AWS D1.4/D1.4M for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

1. Protect precast structural concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
2. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and apply a minimum 4.0-mil- thick coat of galvanized repair paint to galvanized surfaces according to ASTM A780/A780M.
3. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces.
4. Visually inspect welds and remove, reweld, or repair incomplete and defective welds.

G. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.

1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot. For friction connections, apply specified bolt torque and check 25 percent of bolts at random by calibrated torque wrench.

H. Grouting or Dry-Packing Connections and Joints: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on Shop Drawings. Retain flowable grout in place until hard enough to support itself. Alternatively, pack spaces with stiff dry-pack grout material, tamping until voids are completely filled.

1. Place grout and finish smooth, level, and plumb with adjacent concrete surfaces.
2. Fill joints completely without seepage to other surfaces.
3. Trowel top of grout joints on roofs smooth and uniform. Finish transitions between different surface levels not steeper than 1 to 12.
4. Place grout end cap or dam in voids at ends of hollow-core slabs.
5. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.
6. Keep grouted joints damp for not less than 24 hours after initial set.

3.4 ERECTION TOLERANCES

A. Erect precast structural concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.

B. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by Commissioner.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: City of New York will engage a qualified special inspector to perform the following special inspections:

1. Erection of precast structural concrete members.
2. All inspections required by New York State Building Code, latest Edition..

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Field welds will be visually inspected and nondestructive tested according to ASTM E 165 or ASTM E 709. High-strength bolted connections will be subject to inspections.

D. Testing agency will report test results promptly and in writing to Contractor and Commissioner.

E. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.

F. Additional testing and inspecting, at Contractor's expense, to be performed to determine compliance of replaced or additional work with specified requirements.

G. Prepare test and inspection reports.

3.6 CORRECTIVE WORK

A. Repair precast structural concrete units if permitted by Commissioner.

1. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units have not been impaired.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet.

C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A780/A780M.

D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.

E. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by Commissioner.

3.7 CLEANING

A. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034100

SECTION 040110 - MASONRY CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes cleaning the following:

1. Stone surfaces.

1.3 DEFINITIONS

A. Very Low-Pressure Spray: Under 100 psi.

B. Low-Pressure Spray: 100 to 400 psi**;** 4 to 6 gpm.

C. Medium-Pressure Spray: 400 to 800 psi**;** 4 to 6 gpm.

D. High-Pressure Spray: 800 to 1200 psi**;** 4 to 6 gpm.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to cleaning masonry including, but not limited to, the following:

   a. Verify masonry-cleaning equipment and facilities needed to make progress and avoid delays.
   b. Materials, material application, and sequencing.
   c. Cleaning program.

1.5 SEQUENCING AND SCHEDULING

A. Work Sequence: Perform masonry-cleaning work in the following sequence:

1. Remove plant growth.
2. Inspect for open mortar joints. Where corrective work is required, delay further cleaning work until after work is completed, cured, and dried to prevent the intrusion of water and other cleaning materials into the wall.
3. Clean masonry surfaces.

4. Where water repellents are to be used on or near masonry, delay application of these chemicals until after cleaning.

1.6 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include material descriptions and application instructions.
2. Include test data substantiating that products comply with requirements.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For paint-remover manufacturer and chemical-cleaner manufacturer.

B. Preconstruction Test Reports: For cleaning materials and methods.

C. Cleaning program.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Chemical-Cleaner Manufacturer Qualifications: A firm regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory-authorized service representatives who are available for consultation and Project-site inspection and on-site assistance.

C. Cleaning Program: Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, and equipment to be used; protection of surrounding materials; and control of runoff during operations. Include provisions for supervising worker performance and preventing damage.

1. If materials and methods other than those indicated are proposed for any phase of cleaning work, add a written description of such materials and methods, including evidence of successful use on comparable projects and demonstrations to show their effectiveness for this Project.

D. Mockups: Prepare mockups of cleaning on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Cleaning: Clean an area in location and to extent directed by the Commissioner for each type of masonry and surface condition.

a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not test cleaners and methods known to have deleterious effect.
b. Allow a waiting period of not less than seven days after completion of sample cleaning to permit a study of sample panels for negative reactions.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit masonry-cleaning work to be performed according to product manufacturers' written instructions and specified requirements.

B. Clean masonry surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least seven days after completion of cleaning.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS

A. Water: Potable.

B. Hot Water: Water heated to a temperature of 140 to 160 deg F.

C. Detergent Solution, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.

D. Mold, Mildew, and Algae Remover, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 5 quarts of 5 percent sodium hypochlorite (bleach), and 15 quarts of hot water for every 5 gal. of solution required.

E. Nonacidic Gel Cleaner: Manufacturer's standard gel formulation, with pH between 6 and 9, that contains detergents with chelating agents and is specifically formulated for cleaning masonry surfaces.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dumond Chemicals, Inc.; Safe n' Easy Ultimate Stone and Masonry Cleaner.
b. Price Research, Ltd.; Price Marble Cleaner-Gel.
c. PROSOCO, Inc.; Sure Klean 942 Limestone & Marble Cleaner.
d. Or approved equal.

F. Nonacidic Liquid Cleaner: Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABR Products, Inc.; Building Wash 3.
b. Cathedral Stone Products, Inc.; D/2 Biological Solution.
c. PROSOCO, Inc.; Stand Off All Surface Cleaner.
d. Or approved equal.

2.2 ACCESSORY MATERIALS

A. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, glazed masonry, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABR Products, Inc.; ABR Rubber Mask.
b. Price Research, Ltd.; Price Mask.
c. PROSOCO, Inc.; Sure Klean Strippable Masking.
d. Or approved equal.

2.3 CHEMICAL CLEANING SOLUTIONS

A. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended in writing by chemical-cleaner manufacturer.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PROTECTION

A. Comply with each manufacturer's written instructions for protecting existing wall, copings and other surfaces against damage from exposure to its products. Prevent chemical cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless products being used will not damage adjacent surfaces. Use protective materials that are waterproof and UV resistant. Apply masking agents according to manufacturer's written instructions. Do not apply liquid strippable masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
2. Do not apply chemical solutions during winds of enough force to spread them to unprotected surfaces.
3. Neutralize alkaline and acid wastes before disposal.
4. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

3.3 CLEANING MASONRY, GENERAL

A. Cleaning Appearance Standard: Cleaned surfaces are to have a uniform appearance as viewed from 20 feet away by Commissioner.

B. Proceed with cleaning in an orderly manner; work from top to bottom of each wall width and from one end of each elevation to the other. Ensure that dirty residues and rinse water do not wash over dry, cleaned surfaces.

C. Use only those cleaning methods indicated and as recommended in writing by cleaner manufacturer for each stone material and location.

1. Brushes: Do not use wire brushes or brushes that are not resistant to chemical cleaner being used.
2. Spray Equipment: Use spray equipment that provides controlled application at volume and pressure indicated, measured at nozzle. Adjust pressure and volume to ensure that cleaning methods do not damage surfaces, including joints.

a. Equip units with pressure gages.
b. For chemical-cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with nozzle having a cone-shaped spray.
c. For water-spray application, use fan-shaped spray that disperses water at an angle of 25 to 50 degrees.
d. For high-pressure water-spray application, use fan-shaped spray that disperses water at an angle of at least 40 degrees.
e. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.
f. For steam application, use steam generator capable of delivering live steam at nozzle.

D. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, copings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces. Keep wall wet below area being cleaned to prevent streaking from runoff.

E. Perform additional general cleaning, stain removal, and spot cleaning of small areas that are noticeably different when viewed according to the "Cleaning Appearance Standard" Paragraph, so that cleaned surfaces blend smoothly into surrounding areas.

F. Water Application Methods:

1. Water-Soak Application: Soak masonry surfaces by applying water continuously and uniformly to limited area for time indicated. Apply water at low pressures and low volumes in multiple fine sprays using perforated hoses or multiple spray nozzles. Erect a protective enclosure constructed of polyethylene sheeting to cover area being sprayed.
2. Water-Spray Applications: Unless otherwise indicated, hold spray nozzle at least 6 inches from masonry surface and apply water in horizontal back-and-forth sweeping motion, overlapping previous strokes to produce uniform coverage.

G. Steam Cleaning: Apply steam to masonry surfaces at the very low pressures indicated for each type of masonry. Hold nozzle at least 6 inches from masonry surface and apply steam in horizontal back-and-forth sweeping motion, overlapping previous strokes to produce uniform coverage.

H. Chemical-Cleaner Application Methods: Apply chemical cleaners to masonry surfaces according to chemical-cleaner manufacturer's written instructions; use brush or spray application. For spray application, spray apply at pressure recommended in writing by chemical-cleaner manufacturer. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.

I. Rinse off chemical residue and soil by working upward from top to bottom of each treated area at each stage. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed.

1. Apply neutralizing agent and repeat rinse if necessary to produce tested pH of between 6.7 and 7.5.

J. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.4 PRELIMINARY CLEANING

A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing remaining growth to dry as long as possible before removal. Remove loose soil and plant debris from open joints to whatever depth they occur.

B. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to planned cleaning methods. Extraneous substances include paint, calking, asphalt, and tar.

1. Carefully remove heavy accumulations of rigid materials from masonry surface with sharp chisel. Do not scratch or chip masonry surface.

3.5 CLEANING MASONRY

A. Cold-Water Soak:

1. Apply cold water by intermittent spraying to keep surface moist.
2. Use perforated hoses or other means that apply a fine water mist to entire surface being cleaned.
3. Apply water in cycles of five minutes on and 20 minutes off.
4. Continue spraying until surface encrustation has softened enough to permit its removal by water wash, as indicated by cleaning tests.
5. Remove soil and softened surface encrustation from surface with cold water applied by low-pressure spray.

B. Cold-Water Wash: Use cold water applied by low, medium, or high-pressure spray as required for soil and stone type. Do not use pressure rate that will damage stone or existing mortar.

C. Hot-Water Wash: Use hot water applied by low, medium, or high-pressure spray as required for soil and stone type. Do not use pressure rate that will damage stone or existing mortar.

D. Steam Cleaning: Apply steam at very low pressures not exceeding 30 psi. Remove dirt softened by steam with wood scrapers, stiff-nylon or -fiber brushes, or cold-water wash, as indicated by cleaning tests.

E. Detergent Cleaning:

1. Wet surface with cold or hot water applied as recommended in writing my detergent manufacturer for stone and mortar type.
2. Scrub surface with detergent solution using medium-soft brushes, unless otherwise recommended in writing by detergent manufacturer for stone and mortar type being cleaned, until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that surface remains wet.
3. Rinse with cold or hot water applied by low, medium, or high-pressure spray as recommended by cleanser manufacturer for stone and mortar type being cleaned to remove detergent solution and soil.
4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

F. Mold, Mildew, and Algae Removal:

1. Wet surface with cold or hot water applied by low-pressure spray according to mold, mildew and algae remover manufacturers written instructions.
2. Apply mold, mildew, and algae remover by brush or low-pressure spray as recommended in writing by mold, mildew and algae remover manufacturer.
3. Scrub surface with medium-soft brushes,unless otherwise recommended in writing by detergent manufacturer for stone and mortar type being cleaned, until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that surface remains wet.
4. Rinse with cold water applied by or high-pressure spray as recommended by cleanser manufacturer for stone and mortar type being cleaned to remove mold, mildew, and algae remover and soil.
5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

G. Nonacidic Gel Chemical Cleaning:

1. Wet surface with cold or hot water applied by low, medium or high-pressure spray according to nonacidic gel chemical cleaner manufacturers written instructions.
2. Apply gel cleaner in thickness recommended by cleaner manufacturer in writing by brush, working into joints and crevices. Apply quickly and do not brush out excessively, so area is uniformly covered with fresh cleaner and dwell time is uniform throughout area being cleaned.
3. Let cleaner remain on surface for period recommended in writing by chemical-cleaner manufacturer and established by mockup.
4. Remove bulk of gel cleaner.
5. Rinse with cold or hot water applied by low, medium, or high-pressure spray as recommended by cleanser manufacturer for stone and mortar type being cleaned to remove chemicals and soil.
6. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

H. Nonacidic Liquid Chemical Cleaning:

1. Wet surface with cold or hot water applied by low-pressure spray according to nonacidic liquid chemical cleaners written instructions.
2. Apply cleaner to surface in two applications by brush or low-pressure spray according to noncacidic liquid chemical cleaners written instructions.
3. Let cleaner remain on surface for period recommended in writing by chemical-cleaner manufacturer and established by mockup.

4. Rinse with cold or hot water applied by low, medium, or high-pressure spray to remove chemicals and soil according to nonacidic liquid chemical cleaners written instructions.
5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage chemical-cleaner manufacturer's factory-authorized service representatives for consultation and Project-site inspection and provide on-site assistance when requested by Commissioner. Have chemical-cleaner manufacturer's factory-authorized service representatives visit Project site not less than once to observing progress and quality of the work.

3.7 FINAL CLEANING

A. Clean adjacent nonmasonry surfaces of spillage and debris. Use detergent and soft brushes or cloths.

B. Remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

C. Remove masking materials, leaving no residues that could trap dirt.

END OF SECTION 040110

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Shelf Angle Systems
3. Concealed Lintel System
4. Brick.
5. Structural clay facing tile.
6. Mortar and grout materials.
7. Reinforcement.
8. Ties and anchors.
9. Embedded flashing.
10. Accessories.
11. Mortar and grout mixes.

B. Products Installed but not Furnished under This Section:

1. Cast-stone trim in unit masonry.
2. Stone trim units in unit masonry.
3. Steel lintels in unit masonry.
4. Steel shelf angles for supporting unit masonry.
5. Cavity wall insulation adhered to masonry backup.

C. Related Requirements:

1. DDC General Conditions Section 019115 "General Commissioning Requirements for Building Enclosures."
2. Section 031000 "Concrete Forms and Accessories" for installing dovetail or channel slots for masonry-veneer anchors.
3. Section 051200 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
4. Section 054000 "Cold-Formed Metal Framing."
5. Section 072100 "Thermal Insulation" for cavity wall insulation.
6. Section 072715 "Nonbituminous Self-Adhering Sheet Air Barriers."
7. Section 079200 "Joint Sealants."
8. Section 076200 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

9. Section 099611 - "High-Performance Coatings."

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

C. Masonry Veneer: Clay faced Brick masonry of single wythe thickness, anchored to building structure with air cavity behind.

D. Shelf Angle: Structural steel angle providing dead load support to brick masonry veneer, generally attached to building at each slab level

E. Concealed Lintel: Structural support for brick masonry spanning openings at top of windows and doors that is hidden inside of air space and allows appearance of continuous brick from below.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Participants: Contractor, mason, insulation installer, waterproofing installer, roofing installer, curtain wall installer, and any other trades that have scope adjacent to or overlapping brick masonry wall.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:

1. Brick Masonry Units: Indicate sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Indicate bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315R. Indicate elevations of reinforced walls.
3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
4. Shelf Angle System: indicating overall layout, angle sizes, bracket sizes, anchor sizes, anchor locations and other information necessary to fully describe the system.
5. Concealed Lintel system: indicating overall layout, bracket sizes, spline sizes, pencil rod sizes, anchor sizes anchor locations and other information necessary to fully describe the system.

C. Samples for Initial Selection:

1. Clay face brick, in the form of straps of five or more bricks.
2. Colored mortar.
3. Weep/cavity vents.

D. Samples for Verification: For each type and color of the following:

1. CMUs.
2. Clay face brick, in the form of straps of five or more bricks.
3. Special brick shapes. (1) sample of each shape
4. Pigmented colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
5. Weep/cavity vents.
6. Cavity drainage material.
7. Accessories embedded in masonry.

E. Engineering Services Submittals: For masonry anchors and ties, seismic ties, shelf angle, concealed (hung) lintels, including analysis data signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Commissioner and approved in writing.

B. Material Certificates: For each type of the following:

1. Masonry units.

a. Include data on material properties material test reports substantiating compliance with requirements.
b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
c. For exposed brick, include test report for efflorescence in accordance with ASTM C67/C67M.
d. For surface-coated brick, include test report for durability of surface appearance after 50 cycles of freezing and thawing in accordance with ASTM C67/C67M or a list of addresses of buildings in Project's area where proposed brick has been used successfully and with a history of durability.
e. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

2. Integral water repellent used in CMUs.
3. Cementitious materials. Include name of manufacturer, brand name, and type.
4. Mortar admixtures.
5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
6. Grout mixes. Include description of type and proportions of ingredients.
7. Reinforcing bars.
8. Joint reinforcement.

9. Anchors, ties, and metal accessories.

C. Qualifications for Professional Engineer.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test in accordance with ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
2. Include test reports, in accordance with ASTM C1019, for grout mixes required to comply with compressive strength requirement.

E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined in accordance with TMS 602.

F. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/1.

C. Manufacturer Qualifications for brick masonry: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/5.

1.9 MOCKUPS

A. Sample Panel Mockups: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects.

1. Build sample panels as required by commissioner for each type of exposed unit masonry construction in sizes approximately 72 inches long by 96 inches high .
2. Build minimum of 4 panels to demonstrate different mortar and pattern combinations
3. Build sample panels facing south.
4. Include vertical and horizontal control joint filled with specified sealant
5. Coat each sample with specified anti graffiti coating (see section 099611-high-performance coatings)
6. Clean one-half of exposed faces of panels with masonry cleaner indicated.
7. Protect approved sample panels from the elements with weather-resistant membrane.
8. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Commissioner in writing.

    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Commissioner specifically approves such deviations in writing.

B. Wall Mockups: Build mockups to verify selections made under Sample submittals to demonstrate aesthetic effects to set quality standards for materials and execution and to set quality standards for installation. See Section 014000 for additional construction requirements for integrated exterior mockups.

1. Build mockup of full building corner as diagrammed on A-350.
2. Include a sealant-filled joint at least 16 inches long in each exterior wall mockup.
   a. Include lower corner of window opening at upper corner of exterior wall mockup. .
   b. Include through-wall flashing installedin corner of exterior wall mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
   c. Include metal studs, sheathing, water-resistive barrier sheathing joint-and-penetration treatment air barrier, veneer anchors, flashing, cavity drainage material, and weep holes in exterior masonry-veneer wall mockup.
   d. Include anti graffiti coating (see section 099611 - high-performance coatings)
3. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
4. Protect accepted mockups from the elements with weather-resistant membrane.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations by Change Order.
6. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.11 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe, and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain exposed masonry units from single producer or manufacturer.

B. For exposed masonry units and cementitious mortar components, obtain each color and grade from single source with resources to provide materials of consistent quality in appearance and physical properties.

C. Obtain all Shelf Angle components including brackets, angle, washers, shim plates and shim rods from a single manufacturer

D. Obtain all parts of concealed Lintel including brackets, pencil rods, spines, and pre-assembled corners from a single manufacturer

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Masonry to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

B. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) in accordance with TMS 602.

2. Determine net-area compressive strength of masonry by testing masonry prisms in accordance with ASTM C1314.

2.3 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 ft. vertically and horizontally of a walking surface.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, use the equivalent thickness method for masonry units in accordance with ACI 216.1.

2.4 CONCRETE MASONRY UNITS

A. Structural: Refer to contract drawings and documentation for all sizes, grades and other performance criteria.

B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners unless otherwise indicated.

C. CMUs: ASTM C90, normal weight unless otherwise indicated.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength As indicated by Commissioner.
2. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions unless otherwise indicated.

2.5 SHELF ANGLES AND MISC METAL SUPPORTS

A. Thermally Broken Shelf Angle Support System: Steel plate brackets anchored to structure, allowing continuous insulation behind shelf angle supporting masonry veneer. Component and anchor size and spacing provided by manufacturer based on project requirements.

1. Basis of Design Product: Subject to compliance with requirements, provide Fero; Fast Thermal Bracket System or comparable product by one of the following:

a. Halfen USA, Inc.
b. Hohmann & Barnard, Inc.
c. Or approved equal.

2. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 316.

3. Carbon Steel, Galvanized after Fabrication: ASTM A1008/A1008M, with ASTM A153/A153M, Class B coating.
4. Bracket Depth to fill Wall Cavity or as shown in Contract Documents.
5. Bracket height to meet anchor to shelf and distance.
6. Install shelf angle system in compliance with manufacturer's written instructions.
7. Install lateral braces and reinforcement as required to support lateral loads.
8. Coordinate shelf angle, support brackets, braces and all other components with adjacent framing,windows, curtain wall profiles, and other building elements.
9. Shelf Angle thickness and bracket anchorage requirements to be designed by a New York State licensed professional engineer.
10. All shop drawings relating to shelf angle supports and shelf angles to be reviewed and stamped for approval by a New York State licensed professional engineer.

2.6 CONCEALED LINTELS

A. Concealed (Hung Lintels): Steel plates anchored to bottom of exterior steel structural member or slotted into metal spine with through holes allowing tie rods to hold cored brick in soldier course configuration providing lintel to support bricks above with a finished brick return at bottom. Component and anchor size and spacing engineered by manufacturer.

1. Basis of Design Product: Subject to compliance with requirements, provide Hohmann & Barnard Inc.; Concealed Lintel System, or comparable product by one of the following:
   a. Fero Corporation
   b. Halfen USA Inc.
   c. IG Masonry Support

2. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 316
3. Carbon Steel, Galvanized after Fabrication: ASTM A1008/A1008M, with ASTM A153/A153M, Class B coating.
4. Design and size of concealed lintel system to match construction documents and be compatible with project specific brick sizes.
5. Concealed lintel system to incorporate custom corner supports, capable of achieving design intent as indicated in Contract Documents.
6. Install concealed lintel in compliance with manufacturer's written instructions.
7. Concealed Lintel component thickness and bracket anchorage requirements to be designed by a New York State licensed professional engineer.
8. All shop drawings relating to concealed lintel system to be reviewed and stamped for approval by a New York State licensed professional engineer.

2.7 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Clay Face Brick: Facing brick complying with ASTM C216 hollow brick complying with ASTM C652, Class H40V (void areas between 25 and 40 percent of gross cross-sectional area), Grade SW, Type FBS .

1. Basis of Design Product: Subject to compliance with requirements, provide Glen Gery; Roman Maximus, Columbia or comparable product by one of the following:

   a. Acme Brick Company.
   b. Belden Brick Company (The).
   c. Or approved equal.

2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength as required to meet project specific structural criteria.
3. Efflorescence: Provide brick that has been tested in accordance with ASTM C67/C67M and is rated "not effloresced."
4. Surface Coating: Brick with colors or textures produced by application of coatings to withstand 50 cycles of freezing and thawing in accordance with ASTM C67/C67M with no observable difference in the applied finish when viewed from 10 ft. or to have a history of successful use in Project's area.
5. Size (Actual Dimensions): 3-5/8 inches wide by 1-5/8 inches high by 23-5/8 inches long.
6. Application: Use where brick is exposed unless otherwise indicated.
7. Color and Texture: Match Commissioner's samples.

2.8 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C91/C91M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Cemex S.A.B. de C.V.
   b. Federal White Cement, Ltd.
   c. Lafarge North America Inc.
   d. QUIKRETE.
   e. SAKRETE of North America LLC.
   f. Or approved equal.

B. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Davis Colors.
   b. Euclid Chemical Company (The); an RPM company.
   c. Lanxess Corporation.
   d. Solomon Colors, Inc.
   e. Stone Creek Products.
   f. Or approved equal.

C. Aggregate for Mortar: ASTM C144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.

2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

D. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Euclid Chemical Company (The); an RPM company.
b. GCP Applied Technologies Inc.
c. Sika
d. Or approved equal.

E. Water: Potable.

2.9 REINFORCEMENT

A. Masonry-Joint Reinforcement, General: ASTM A951/A951M.

1. Exterior Walls: Hot-dip galvanized carbon steel.
2. Wire Size for Side Rods: 0.148-inch diameter.
3. Wire Size for Cross Rods: 0.148-inch diameter.
4. Wire Size for Veneer Ties: 0.148-inch diameter.
5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
6. Provide in lengths of not less than 10 ft., with prefabricated corner and tee units.

B. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hohmann & Barnard, Inc.
b. Wire-Bond.
c. OCM Inc.
d. Or approved equal.

2.10 TIES AND ANCHORS

A. General: Ties and anchors extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A1064/A1064M, with ASTM A153/A153M, Class B-2 coating.
2. Stainless Steel Wire: ASTM A580/A580M, Type 304.
3. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.

4. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
5. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
6. Stainless Steel Bars: ASTM A276 or ASTM A666, Type 304.

C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, stainless steel wire.
2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, stainless steel wire.

D. Partition Top Anchors For CMU: 0.105-inch- thick metal plate with a 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

E. Rigid Anchors For CMU: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A153/A153M.

F. Adjustable Masonry-Veneer Anchors :

1. General: Provide anchors that allow vertical adjustment but resist a 100 lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.
2. Fabricate wire ties from 0.187-inch- diameter, stainless steel wire unless otherwise indicated.
3. Unless otherwise indicated, provide Single-Barrel Screw with Double-Pintle Wingnut Anchor specified below.
4. Masonry-Veneer Anchors; Vertical Slotted L-Plate: Rib-stiffened, sheet metal anchor section with screw holes at top and bottom, projecting vertical leg with slotted hole for wire tie.Provide with seismic tie, clip, and continuous wire in veneer.

   a. Basis of Design Product: Subject to compliance with requirements, provide Hohman and Barnard; BL-407 or comparable product by one of the following:

      1) Heckmann Building Products, Inc.
      2) Wire Bond
      3) Or approved equal.
      4)

   b. Material: 316 Stainless Steel

5. Masonry-Veneer Anchors; Single-Barrel Screw with Double-Pintle Wingnut: Self-drilling, single-barrel screw with thermally resistant wingnut head designed to receive double-pintle wire tie. Screw has a smooth barrel the same thickness as insulation with factory-installed gasketed washer to seal at face of insulation and sheathing and a coating to reduce thermal conductivity. Provide with seismic tie, clip, and continuous wire in veneer.

   a. Basis of Design Product: Subject to compliance with requirements, provide Hohman and Barnard, Thermal 2-Seal Wing Nut Anchor or comparable product by one of the following:

      1) Heckmann Building Products, Inc.
      2) Wire Bond

3) Or approved equal.

6. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours in accordance with ASTM B117.
7. Stainless Steel Drill Screws for Steel Studs: ASTM C954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads; either made from Type 410 stainless steel or made with a carbon-steel drill point and 300 Series stainless steel shank.

2.11 EMBEDDED FLASHING

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304 , 0.032 inch thick.
2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 ft.. Provide splice plates at joints of formed, smooth metal flashing.
3. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with sawtooth ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Cheney Flashing Company.
      2) Hohmann & Barnard, Inc.
      3) Keystone Flashing Company, Inc.
      4) Or approved equal.

4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
5. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
6. Fabricate through-wall flashing with sealant stop where indicated. Fabricate by bending metal back on itself 3/4 inch at exterior face of wall and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
7. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.
8. Solder metal items at corners.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Self-Adhering, Stainless Steel Fabric Flashing: Composite, flashing product consisting of 2 mil of Type 304 stainless steel sheet, bonded to a layer of polymeric fabric with a butyl adhesive, to produce an overall thickness of 10 mil or 40 mil.

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Hohmann & Barnard, Inc.

2) STS Coatings, Inc.
3) VaproShield LLC.
4) Wire-Bond.
5) Or approved equal.

b. Applications: Use 10-mil- thick flashing at windows, doors, and small wall penetrations; not at base of walls. Use 40-mil- thick flashing at base of walls.

2. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 35 mil.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) DuPont de Nemours, Inc.
2) GCP Applied Technologies Inc.
3) Protecto Wrap Company.
4) Or approved equal.

b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

3. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Hohmann & Barnard, Inc.
2) Hyload, Inc.
3) Mortar Net Solutions.
4) Or approved equal.

b. Self-Adhesive Sheet: Elastomeric thermoplastic flashing, 25 mil thick, with a 15-mil- thick coating of adhesive.

c. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

2.12 ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Weep/Cavity Vents: Use one of the following unless otherwise indicated:

1. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1-1/2 by 3-1/2 inches long.

2. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Advanced Building Products Inc.
        2) Heckmann Building Products, Inc.
        3) Hohmann & Barnard, Inc.
        4) Or approved equal.

C. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Mortar Deflector: Strips, full depth of cavity and 10 inches high, with dovetail-shaped notches that prevent clogging with mortar droppings.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Advanced Building Products Inc.
        2) Hohmann & Barnard, Inc.
        3) Mortar Net Solutions.
        4) Or approved equal.

D. Acidic Masonry Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Diedrich Technologies, Inc.; a Hohmann & Barnard company.
    b. EaCo Chem, Inc.
    c. PROSOCO, Inc.
    d. Or approved equal.

2.13 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use masonry cement mortar unless otherwise indicated.
3. For exterior masonry, use masonry cement mortar.
4. For reinforced masonry, use masonry cement mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type M.
2. For reinforced masonry, use Type S.
3. For mortar parge coats, use Type N.
4. For exterior, above-grade, load-bearing, nonload-bearing walls, and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
5. For interior nonload-bearing partitions, Type O may be used instead of Type N.

C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments do not exceed 10 percent of portland cement by weight.
2. Pigments do not exceed 5 percent of masonry cement by weight.
3. Mix to match Commissioner's sample.
4. Application: Use pigmented mortar for exposed mortar joints with thhe following units: Typical at all exposed brick as required by Commissioner .

D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

1. Mix to match Commissioner's sample.
2. Application: Use colored-aggregate mortar for exposed mortar joints with the following units: Typical at all exposed brick as required by Commissioner.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

F. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested in accordance with ASTM C67/C67M. Allow units to absorb water so they are damp but not wet at time of laying.

3.4 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 ft., or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 ft., 1/4 inch in 20 ft., or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 ft., 3/8 inch in 20 ft., or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 ft., 1/4 inch in 20 ft., or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 ft., 3/8 inch in 20 ft., or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 ft., or 1/2-inch maximum.

7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.5 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.

2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors, and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.6 MORTAR BEDDING AND JOINTING

A. Lay CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.
4. Rake out mortar joints for pointing with sealant.

D. Rake out mortar joints at to a uniform depth of 1/4 inch and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

1. For glazed masonry units, use a nonmetallic jointer 3/4 inch or more in width.

F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

G. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

3.7 COMPOSITE MASONRY

A. Bond wythes of composite masonry together using one of the following methods:

1. Individual Metal Ties: Provide ties as indicated installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.

    a. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) ties.

2. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.

    a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
    b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties.

3. Header Bonding: Provide masonry unit headers extending not less than 3 inches into each wythe. Space headers not more than 12 inches clear horizontally and 16 inches clear vertically.

B. Bond wythes of composite masonry together using bonding system indicated on Drawings.

C. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.

D. Collar Joints in Clay Tile Masonry: After each course is laid, fill the vertical, longitudinal joint between wythes solidly with mortar at exterior walls, except cavity walls.

E. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.

1. Provide continuity with masonry-joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.

F. Intersecting and Abutting Walls: Unless vertical expansion or control joints are indicated at juncture, bond walls together as follows:

1. Provide individual metal ties not more than 8 inches o.c.
2. Provide continuity with masonry-joint reinforcement by using prefabricated T-shaped units.
3. Provide rigid metal anchors not more than 24 inches o.c. If used with hollow masonry units, embed ends in mortar-filled cores.

3.8 CAVITY WALLS

A. Bond wythes of cavity walls together using one of the following methods:

1. Individual Metal Ties: Provide ties as indicated installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.

a. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) ties.
b. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) ties to allow for differential movement regardless of whether bed joints align.

2. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.

a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties.
c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.

3. Header Bonding: Provide masonry unit headers extending not less than 3 inches into each wythe. Space headers not more than 12 inches clear horizontally and 16 inches clear vertically.
4. Masonry-Veneer Anchors: Comply with requirements for anchoring masonry veneers.

B. Bond wythes of cavity walls together using bonding system indicated on Drawings.

C. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

D. Parge cavity face of backup wythe in a single coat approximately 3/8 inch thick. Trowel face of parge coat smooth.

E. Installing Cavity Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as indicated.

1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.9 ANCHORED MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed connector sections and continuous wire in masonry joints.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 25 inches o.c. horizontally, with not less than one anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

B. Provide not less than 1-1/2 inches of airspace between back of masonry veneer and face of insulation.

1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

3.10 MASONRY-CELL FILL

A. Pour loose-fill insulation into cavities to fill void spaces. Maintain inspection ports to show presence of fill at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of fill to one story high, but not more than 20 ft..

B. Install molded-polystyrene insulation units into masonry unit cells before laying units.

C. Drill holes in mortar bed joints at spacing as indicated by foamed-in-place masonry fill manufacturer, and inject foam to fill masonry cell voids.

3.11 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.12 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:

1. Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.13 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.

C. Form expansion joints in brick as follows:

1. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."

D. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.14 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry or offset angle support lintels where indicated and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are indicated without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.15 FLASHING, WEEP HOLES, AND CAVITY VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 8 inches, and through inner wythe to within 1/2 inch of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately 2 inches on interior face.

3. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 8 inches, and 1-1/2 inches into the inner wythe.
4. At masonry-veneer walls, extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under air barrier, lapping at least 4 inches. Fasten upper edge of flexible flashing to sheathing through termination bar.
5. At lintels and shelf angles, extend flashing 6 inches minimum, to edge of next full unit at each end. At heads and sills, extend flashing 6 inches minimum, to edge of next full unit and turn ends up not less than 2 inches to form end dams.
6. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

D. Install reglets and nailers for flashing and other related construction where they are indicated to be built into masonry.

E. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.

1. Use specified weep/cavity vent products to form weep holes.
2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 24 inches o.c. unless otherwise indicated.
4. Space weep holes formed from plastic tubing 16 inches o.c.
5. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.
6. Trim wicking material flush with outside face of wall after mortar has set.

F. Place pea gravel in cavities as soon as practical to a height equal to height of first course above top of flashing, but not less than 2 inches, to maintain drainage.

1. Fill cavities full height by placing pea gravel in cavities as masonry is laid, so that at any point, masonry does not extend more than 24 inches above top of pea gravel.

G. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Accessories" Article.

H. Install cavity vents in head joints in exterior wythes at spacing indicated. Use specified weep/cavity vent products to form cavity vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.16 REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches .

3.17 FIELD QUALITY CONTROL

A. Testing Agency for Special Inspections: City of New York will engage a qualified testing agency to perform special tests and inspections. Allow special inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements will be at Contractor's expense.

B. Special Inspections: Inspections in accordance with Level 2 in TMS 402.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Clay Masonry Unit Test: For each type of unit provided, in accordance with ASTM C67/C67M for compressive strength.

F. Concrete Masonry Unit Test: For each type of unit provided, in accordance with ASTM C140/C140M for compressive strength.

G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, in accordance with ASTM C780.

H. Mortar Test (Property Specification): For each mix provided, in accordance with ASTM C780. Test mortar for mortar air content and compressive strength.

3.18 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.19 CORRECTIVE WORK, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Commissioner's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
7. Clean masonry with a proprietary acidic masonry cleaner applied according to manufacturer's written instructions.

3.20 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in each dimension.

2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off City of New York's property.

END OF SECTION 042000

SECTION 044200 - EXTERIOR STONEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract (City of New York Standard Construction Contract).

1.2 SUMMARY

A. Section Includes:

1. Stone steps with natural riser face set in mortar setting bed.
2. Stone veneer and copings at retaining wall set with anchors or mortar, to match existing to remain.
3. Field stone boulders and boulder seats set in gravel base.
4. Stone anchorages, attachments, reinforcements, setting and grouting materials and related installation accessories.

B. Related Sections:

1. Section 033000 "Cast in Place Concrete" for cast in place concrete footings.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures".

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of stone, stonework accessory and other manufactured product required.

B. Shop Drawings: Submit cutting and setting drawings indicating sizes, dimensions, sections and profiles of stones; arrangement and provisions for jointing, supporting, and anchoring stonework; and details showing relationship with, attachment to, and reception of, related work.

1. Provide details for, and show location of, inserts for support of stone.
2. Make a combined submittal that shows stonework, substrates, supports, stone anchors, mortar, grout, and other adjacent work in schematic form, and other related components. Assemble Shop Drawings of all components into this submittal and prepare coordination details and erection details for the stonework.
3. Provide plans, elevations, sections and large scale details of all stone elements.

C. Samples: Submit sets of samples for each color, grade, finish, type and variety of stone consisting of units in number of pieces directed by the Commissioner of each full size stone type. Sets of samples must show the anticipated full range of appearance characteristics to be expected in completed work.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements".

B. Single Source Responsibility for Stone: Obtain each color, grade, finish, type and variety of stone from a single source with resources to provide materials of consistent quality in appearance and physical properties, including the capacity to cut and finish material without delaying the progress of the Work.

C. Single Source Responsibility for Setting Materials: Obtain mortar ingredients of uniform quality and from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

D. Mockups: Prepare field constructed mock-up for the specified stonework to extent and in locations directed by the Commissioner . Purpose of mock-up is further verification of selections made for color and finish under sample submittals and establishing standard of quality for aesthetic effects expected in completed work.

1. Include mockup of stone veneer clad wall with coping, demonstrating range of expected color and finish of the final Work. Include anchors, mortar, grout, and tooling of joints.
2. Provide mockups of other stone assemblies specified herein to the extent and in locations directed by the Commissioner.
3. Subject to compliance with requirements, approved mock-ups may become part of the work of Substantial Completion.

E. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

F. Testing of Existing Stone for Identification: Contractor must be responsible for examination, visual identification, chemical testing, and/or research for identification of stone types and finishes used in existing retaining walls and copings to remain to verify matching of species for new stone veneers and copings for new retaining walls to be provided as part of the Work of this Section.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project in undamaged condition.

B. Handle stone to prevent chipping, breakage, soiling or other damage. Do not use pinch or wrecking bars without protecting edges of stone with wood or other rigid materials. Lift with wide-belt type slings wherever possible; do not use wire rope or ropes containing tar or other substances which might cause staining. If required, use wood rollers and provide cushion at end of wood slides.

C. Store stone on wood skids or pallets, covered with non-staining, waterproof membrane. Place and stack skids and stones to distribute weight evenly and to prevent breakage or cracking of stones. Protect stored stone from weather with waterproof, non-staining covers or enclosures, but allow air to circulate around stones.

1.7 PROJECT CONDITIONS

A. Cold Weather Protection: Do not lay stonework when temperature of air or masonry materials is less thdan 40 degrees F. without taking precautions to prevent damage to work. Comply with the following requirements:

1. Remove ice or snow formed on stonework beds by carefully applying heat until top surface is dry to the touch.
2. Remove stonework damaged by freezing conditions.

B. Installer must review installation procedures and coordination with other work, with Contractor, and other trades and subcontractors whose work will be affected by stonework.

C. Partially cover completed stonework when work is not in progress. Extend cover a minimum of 24" around all sides and hold securely in place.

1. Prevent staining of stone from mortar and other sources. Immediately remove such materials without damage to stone.
2. Protect stonework and adjacent construction from mud and mortar splatter with coverings spread on ground and over adjacent surface.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Corrosion and Stain Control: Prevent galvanic and other types of corrosion or staining by isolating metals and other materials from direct contact with incompatible materials, or by applying suitable coatings; staining of stone and joint surfaces is not permitted.

B. Coefficient of Friction for Stone Steps: 0.42.

C. Sustainability: Comply with ANSI/NSC 373 for natural stone quarrying and fabrication operations at Gold certification level.

D. Design Load Requirements for Retaining Walls: As indicated on Structural Drawings and Specifications.

2.2 GRANITE STEPPING STONES AND BOULDERS

A. Material Standard: Comply with ASTM C 615.

1. Classification: Type S except as follows: absorption, 5 percent by weight maximum; density, 150 lb/cu. ft. minimum; compressive strength, 8000 psi minimum; and modulus of rupture 800 psi minimum, unless otherwise indicated or directed by the Commissioner.

B. Basis of Design Product: Subject to compliance with requirements, provide Vermont Stone Art "VSA Cable Gray, Rocker Finish" and "VSA Arctic Gray, Rocker Finish", or comparable product by one of the following:

1. Champlain Stone.
2. Cold Spring USA.
3. Or approved equal.

C. Match Commissioner's samples for color, finish, and other stone characteristics relating to aesthetic effects.

1. Thickness as Dimensions: As indicated on the Drawings.

2.3 GRANITE COPINGS AND VENEER WALL CLADDING

A. Material Standard: Comply with ASTM C 615.

1. Classification: To match existing historic Granite walls at East Tremont Avenue.

B. Varieties and Sources: Subject to compliance with requirements provide Granite by one of the following:

1. Vermont Stone Art.
2. Champlain Stone.
3. Cold Spring USA.
4. Or approved equal.

C. Match Commissioner's New York City Parks Department approved samples for unit sizes, types, color variations, finish, and other stone characteristics relating to aesthetic and performance requirements.

1. Thickness as Dimensions: As indicated on the Drawings.

2.4 STONE ACCESSORIES

A. Setting Buttons: Lead or resilient plastic buttons, non-staining to stone, sized to suit joint thicknesses and bed depths of stonework involved.

B. Cleaner: Provide stone cleaners of proper formulation for kinds of stones, finishes and applications indicated, as recommended by stone producer. Do not use acid-type cleaning agents or other cleaning compounds containing caustic or harsh fillers, except where expressly approved by stone producer for type of condition involved.

C. Gravel Base for Boulders: Sound, crushed screenings complying with ASTM D 448 and New York City Parks Department standards for No. 67.

2.5 ANCHORS/PINS

A. Fabricate anchors from stainless steel, ASTM A 666, Type 316, of temper, size and anchor type as required to support loads imposed by stonework specified and indicated without exceeding allowable design stresses.

2.6 MORTAR MATERIALS

A. Thick Bed Setting Mortar: Dry sand cement mixture with latex modified admixture.

B. Bonding Agent: ASTM C 1059, Type I or II.

C. Masonry Cement: ASTM C 91, with acrylic polymer, of type and compressive strength required to install stone veneer and copings and meet or exceed imposed load requirements.

D. Masonry Sand: ASTM C 144, of type required to properly install stone veneer.

E. Water: Clean, clear, non-alkaline, potable and free of any deleterious material that might cause any staining or discoloration of stone, mortar or grout.

2.7 MORTAR AND GROUT MIXES

A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds, or calcium chloride, unless otherwise indicated.

B. Mixing: Combine and thoroughly mix cementitious materials, water and aggregates in a mechanical batch mixer; comply with referenced ASTM or ANSI standard, as applicable, for mixing time and water content, unless otherwise indicated. Use minimal amount of water necessary to work into place.

C. Setting Mortars for Stone: Comply with mixing requirements of ANSI Standards referenced for materials and installation methods.

2.8 FABRICATION, GENERAL

A. General: Fabricate stonework in sizes and shapes required to comply with requirements indicated, including details on Drawings and final Shop Drawings.

B. Cut and drill sinkages and holes in stones for anchors, fasteners, supports and lifting devices as indicated or needed to set stonework securely in place; shape beds to fit supports.

C. Control depth of stones and back-check to maintain minimum clearances indicated between backs of stones and surfaces or projections of other work behind stones.

D. Contiguous Work: Provide chases, openings and similar features as required to accommodate contiguous work.

E. Finish exposed faces and edges of stones to comply with requirements indicated for finish under each type and application of stone required and to match approved samples and field-constructed mock-ups.

F. Carefully inspect finished stones at quarry for compliance with requirements relative to qualities of appearance, material and fabrication; replace defective stones with ones that do comply. Patched, glued, applied or other face repairs are not permitted.

1. Grade and mark stones for overall appearance when assembled in place. Natural variations in appearance are acceptable if installed stones match range of colors and other appearance characteristics represented in approved samples and field-constructed mock-ups.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Require Installer to examine surfaces to receive stonework and conditions under which stonework will be installed and to report in writing any conditions which are not in compliance with requirements. Do not proceed with installation until surfaces and conditions comply with requirements indicated or for execution of other work which affects stonework.

B. Take field measurements prior preparation of Shop Drawings and fabrication of stones. Where field measurements cannot be obtained note these required conditions on Shop Drawings.

3.3 PREPARATION

A. Advise Installers of other work about specific requirements relating to placement of inserts, and similar items which will be used by Stonework Installer for anchoring and supporting of the stonework. Furnish Installers of other work with drawings or templates showing locations of these items.

B. Clean stone surfaces which have become dirty or stained prior to setting to remove soil, stains and foreign materials. Clean stones by thoroughly scrubbing stones with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh filler or abrasives.

3.4 SETTING STONE

A. Execute stonework installation by skilled mechanics and employ skilled stone fitters at Project site to do necessary field cutting as stone is set.

1. Use power saws with diamond blades to cut stone.
2. For stone veneer clad retaining walls, provide stone face dimensions to match stone face dimensions of existing retaining walls to remain.

B. Contiguous Work: Provide openings as required to accommodate contiguous work.

C. Set stone to comply with requirements indicated on Drawings and Shop Drawings. Install anchors, supports, mortars, fasteners, and other attachments indicated or necessary to secure stonework in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances.

D. Provide joint widths in stone veneer retainer wall to match joint widths of existing retaining walls to remain.

E. Set stone copings for new stone veneer clad retaining walls with mortar and anchors, in compliance with approved Shop Drawings.

3.5 INSTALLATION TOLERANCES

A. Variation from Plumb: For vertical lines, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For other conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch in 40 feet or more.

B. Variation from Level: For stairs, and other conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.

3.6 ADJUSTMENT AND CLEANING

A. Remove and replace stonework of the following description.

1. Broken, chipped, stained or otherwise damaged stones.
2. Stones not matching approved samples and field-constructed mock-ups.
3. Stonework not complying with other requirements indicated.

B. Replace in manner which results in stonework matching approved samples and field-constructed mock-ups, complying with other requirements and showing no evidence of replacement.

C. Clean stonework after setting and curing is complete; use procedures recommended by stone producer for types of application indicated.

D. Before inspection for Substantial Completion, remove protective covering and clean surfaces using procedures and materials recommended by manufacturer.

END OF SECTION 044200

SECTION 047200 - CAST STONE MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Trim units including window sills and other items indicated on drawings.
2. Mortar materials.
3. Accessories.

B. Related Requirements:

1. Section 042000 "Unit Masonry."

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For cast stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.

C. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.

1. Include building elevations showing layout of units and locations of joints and anchors.

D. Engineering Services Submittal: For cast stone units including anchorage, including analysis data signed and sealed by a qualified, New York State licensed professional engineer responsible for their preparation.

E. Samples for Verification:

1. For each color and texture of cast stone required, 4 inches square in size.
2. For each trim shape required, 4 inches in length.
3. For colored mortar, make Samples using same sand and mortar ingredients to be used on Project.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and testing agency.

B. Material Test Reports: For each mix required to produce cast stone, based on testing.

1. Provide test reports based on testing within previous six months.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

C. Furnish cast stone for installation in mockups specified in Section 042000 "Unit Masonry."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of cast stone with unit masonry work to avoid delaying the Work and to minimize the need for on-site storage.

B. Pack, handle, and ship cast stone units in suitable packs or pallets.

1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units if required, using dollies with wood supports.
2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store mortar aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

1.8 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements in TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until cast stone has dried, but no fewer than seven days after completing cleaning.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements in TMS 602.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Cast Stone: Obtain cast stone units from single source from single manufacturer.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design cast stone units including anchorage.

B. Fabricate and install work to withstand normal loads from wind, gravity, movement of building structure, and thermally induced movement, applicable code required loading, as well as to resist deterioration under normal use, including exposure to weather, without failure.

1. Design wind pressures in accordance with the Building Code requirements but not less than 30 psf inward and outward, unless otherwise required by structural requirements for project location.

2.3 CAST STONE MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or Type III, containing not more than 0.60 percent total alkali when tested according to ASTM C114. Provide natural color or white cement as required to produce cast stone color indicated.

B. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C33/C33M; gradation and colors as needed to produce required cast stone textures and colors.

C. Fine Aggregates: Natural sand or crushed stone complying with ASTM C33/C33M, gradation and colors as needed to produce required cast stone textures and colors.

D. Color Pigment: ASTM C979/C979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

E. Admixtures: Use only admixtures specified or approved in writing by Commissioner.

1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
3. Air-Entraining Admixture: ASTM C260/C260M. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 4 to 6 percent, except do not add to zero-slump concrete mixes.

F. Reinforcement:

1. Deformed steel bars complying with ASTM A615/A615M, Grade 40. Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches of cast stone material.

   a. Galvanized Coating: ASTM A767/A767M.
2. Fiber Reinforcement: ASTM C1116/C1116M.

2.4 CAST STONE UNITS

A. Basis-of-Design Product: Subject to compliance with requirements, provide cast stone units by RockCast, a product of Reading Rock, Inc. or comparable by one of the following:

1. Architectural Cast Stone (ACS).
2. Advanced Architectural Stone (AAS).
3. Heritage Cast Stone.
4. Or approved equal.

B. Cast Stone Units: Comply with selected manufacturers testing method or ASTM C1364.

1. Units to be manufactured using the manufacturer's selected method.
2. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666, Procedure A, as modified by ASTM C 1364, or are made from cast stone that has a history of successful resistance to freezing and thawing..
3. Shapes and sizes as indicated on drawings but no less than 48 inch long sections.

C. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.

1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
3. Provide drips on projecting elements unless otherwise indicated.

D. Fabrication Tolerances:

1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
2. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.

E. Cure Units as Follows:

1. Cure units in enclosed, moist curing room at 95 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.
2. Keep units damp and continue curing to comply with one of the following:

   a. No fewer than five days at mean daily temperature of 70 deg F or above.
   b. No fewer than seven days at mean daily temperature of 50 deg F or above.

F. Colors and Textures: As selected by Commissioner from manufacturer's full range, similar to RockCast, Light Grey and Smokehouse.

2.5 MORTAR MATERIALS

A. Provide mortar materials that comply with Section 042000 "Unit Masonry."

B. Colored Cement Products: Packaged blend made from and mortar pigments, all complying with specified requirements, and containing no other ingredients.

C. Preblended Dry Mortar Mix: Packaged blend made from , sand, and admixtures and complying with ASTM C1714/C1714M.

D. Aggregate for Mortar: ASTM C144 unless otherwise indicated.

E. Water: Potable.

2.6 ACCESSORIES

A. Dowels: 1/2-inch- diameter round bars, fabricated from Type 316 stainless steel complying with ASTM A240/A240M, ASTM A276/A276M, or ASTM A666.

2.7 MORTAR MIXES

A. Comply with requirements in Section 042000 "Unit Masonry" for mortar mixes.

2.8 SOURCE QUALITY CONTROL

A. When directed by Commissioner, engage a qualified independent testing agency to sample and test cast stone units.

1. Include one test for resistance to freezing and thawing.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 SETTING CAST STONE IN MORTAR

A. Set cast stone as indicated in TMS 604.

B. Install cast stone units to comply with requirements in Section 042000 "Unit Masonry" unless otherwise indicated.

C. Set cast stone as indicated on Drawings. Set units accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Coordinate installation of cast stone with installation of flashing specified in other Sections.

D. Wet joint surfaces thoroughly before applying mortar or setting in mortar.

E. Set units in full bed of mortar with full head joints unless otherwise indicated.

1. Set units with joints 1/4 to 3/8 inch wide unless otherwise indicated.
2. Build anchors and ties into mortar joints as units are set.
3. Fill dowel holes and anchor slots with mortar.
4. Fill collar joints solid as units are set.
5. Build concealed flashing into mortar joints as units are set.
6. Keep head joints in copings and between other units with exposed horizontal surfaces open to receive sealant.
7. Keep joints at shelf angles open to receive sealant.

F. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.

G. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.

H. Tool exposed joints slightly concave when thumbprint hard. Use a smooth plastic jointer larger than joint thickness.

I. Rake out joints for pointing with sealant to depths of not less than 3/4 inch. Scrub faces of units to remove excess mortar as joints are raked.

J. Point joints with sealant to comply with applicable requirements in Section 079200 "Joint Sealants."

1. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.

K. Provide sealant joints at head joints of copings and other horizontal surfaces; at expansion, control, and pressure-relieving joints; and at locations indicated.

1. Keep joints free of mortar and other rigid materials.
2. Build in compressible foam-plastic joint fillers where indicated.
3. Form joint of width indicated, but not less than 3/8 inch.

4. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
5. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.4 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

A. Set cast stone as indicated in TMS 604.

B. Set cast stone as indicated on Drawings. Set units accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.

C. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout.

D. Fill anchor holes with sealant.

1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.

E. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.

F. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.

1. Form open joint of width indicated, but not less than 3/8 inch.

G. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.

H. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.5 INSTALLATION TOLERANCES

A. Variation from Plumb: Do not exceed 1/4 inch in 10 ft., , or 1/2 inch maximum.

B. Variation from Level: Do not exceed 1/8 inch in 10 ft., , or 1/2 inch maximum.

C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.

D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except where variation is due to warpage of units within tolerances specified.

3.6 ADJUSTING AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Commissioner.

B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean cast stone as work progresses.

1. Remove mortar fins and smears before tooling joints.
2. Remove excess sealant immediately, including spills, smears, and spatter.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Commissioner's approval of sample cleaning before proceeding with cleaning of cast stone.
3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean cast stone by methods described in Cast Stone Institute Technical Bulletin #39.
6. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION 047200

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Structural Steel.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

B. Heavy Sections: Rolled and built-up sections as follows:

1. Shapes included in ASTM A6/A6M with flanges thicker than 1-1/2 inches.
2. Welded built-up members with plates thicker than 2 inches.
3. Column base plates thicker than 2 inches.

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data:

1. Structural-steel materials.

2. High-strength, bolt-nut-washer assemblies.
3. Anchor rods.
4. Shop primer.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Do not fabricate or deliver work to the site before drawings reviewed by the Commissioner have been returned.
6. Before preparing steel shop drawings, submit proposed submittal schedule for review by the Commissioner.
7. Before preparing steel shop drawings, submit for review a set of job standards showing all necessary joint details with full particulars of connection pieces, shop and field welds, and holes for erection bolts and permanent bolts. These must include any moment and shear connections. Appropriate marks for designating all types and sizes of joint details must be included. After approval of these job standards, the erection plans are to be submitted and will be marked to indicate unmistakably the type and size of joint to be used for every beam connection. Do not order steel in advance of approval of the job standards and the erection plans with joint marks, except at own risk.
8. Submit calculations for design of connections on job standards and all other connections such as moment and brace frames. Calculations must be signed and sealed by a Professional Engineer licensed in the State of New York.
9. Prepare remainder of steel shop drawings after approval of job standards and erection plans. Drawings submitted prior to approval of job standards will be returned without review.
10. Prepare shop drawings in conformance with the applicable procedures shown in "Detailing for Steel Construction," latest edition, published by AISC. Prepare shop drawings under the supervision of a competent Professional Engineer, licensed in the State of New York. During the preparation of shop drawings, and prior to submittal, coordinate and cross check all shop drawings, including those prepared by subcontractors, for compliance with the Contract Documents.
11. Indicate clearly the size and grade of steel for each component. Identify rolled shapes, tubes and plates by using the standard designations used in "Steel Construction Manual" Latest Edition, by AISC.
12. Indicate welds and nondestructive tests by using the symbols conforming to AWS A2.4 "Symbols for Welding and Nondestructive Testing." Where necessary for clarity, indicate welding procedure designations or other data in the tail of the welding symbol.
13. Show explicitly the type of connection used in each location, including the grade, size, and number of bolts; the type, number, position, designation and orientation of each washer; and the size of each hole, whether slotted or round. Ensure that adequate wrench clearance for correct bolt tightening is provided and note special bolt tightening sequences where applicable and necessary.
14. Show all camber dimensions in the shop drawings. Where specific camber is not shown in the drawings, note on each affected shop drawing that such members are to be fabricated with the natural camber up.
15. Show holes required for securing work specified in other sections to structural steelwork, as well as all holes required for passage through structural steelwork of work of other trades. Provide field work drawings for all such holes not shown in shop or erection drawings. Addition of, or change in size or location of openings will not be permitted without prior approval.

16. Use bolted connections wherever possible; avoid field welding unless otherwise noted on drawings.
17. Make details in such a way as to avoid having steel, connections, bracing, bolts, etc., interfere with architectural details or in any way reduce the areas of shafts, openings, clearances, etc.
18. Detail and schedule cleaning and painting data and requirements, including specific indication of "no-paint" areas.
19. Identify members and connections of the seismic-load-resisting system.
20. Identify members not to be shop primed.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide in accordance with AWS D1.1/D1.1M for each welded joint qualified by testing, including the following:

1. Power source (constant current or constant voltage).

D. Engineering Services Submittal: For structural-steel connections indicated on Drawings to comply with design loads, include analysis data signed and sealed by the qualified professional engineer licensed in the State of New York responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer & fabricator.

B. Mill test reports for structural-steel materials, including chemical and physical properties.

C. Product Test Reports: For the following:

1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.

D. Source quality-control reports.

E. Field quality-control reports.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).

C. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector .

D. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

1. Welders and welding operators performing work on bottom-flange, demand-critical welds must pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G are considered separate processes for welding personnel qualification.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided City of New York's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

1.10 PERFORMANCE REQUIREMENTS

A. Comply with applicable provisions of the following specifications and documents:

1. ANSI/AISC 303.
2. ANSI/AISC 360.
3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

B. Connections: Provide details of all connections required by the Drawings to be completed by structural steel fabricator (including comprehensive engineering analysis by a qualified professional engineer licensed in the State of New York) to withstand loads indicated and comply with other information and restrictions indicated, unless noted otherwise.

1. Select and complete connections using schematic details indicated and AISC 360.
2. Use design method indicated on structural Drawings.
3. Moment Connections: Fully restrained unless otherwise noted on Drawings.

C. Lateral Force Resisting System: Type used is indicated on structural drawings.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 95 percent.

B. W-Shapes: ASTM A992/A992M.

C. Channels, Angles, M-Shapes, S-Shapes: ASTM A36/A36M .

D. Plate and Bar: ASTM A36/A36M.

E. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade C structural tubing.

F. Pipe Shapes: ASTM A53 Grade B.

G. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS AND CONNECTORS

A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

B. High-Strength A490 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A490, Type 1, heavy-hex steel structural bolts or Grade F2280 tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, head assemblies, consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

1. Finish: Mechanically deposited zinc coating for galvanized steel applications..

2.3 RODS

A. Headed Anchor Rods: ASTM F1554, Grade 55, weldable, straight.

1. Nuts: ASTM A563 heavy-hex carbon steel.
2. Plate Washers: ASTM A36/A36M carbon steel.
3. Washers: ASTM F436, Type 1, hardened carbon steel.
4. Finish: Plain.

2.4 PRIMER

A. Steel Primer:

1. Comply with Section 099123 "Interior Painting" and Section 099611 "High Performance Coatings" and finish requirements noted on drawings.

a. For steel not designated as exposed on Drawings, provide one coat of shop primer.
b. Manufacturers: Subject to compliance with requirement, provide shop primer by one of the following:

1) Tnemec.
2) Benjamin Moore.
3) Sherwin Williams.
4) Or approved equal.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up, except for cantilevered members which must be erected to have the camber raise the cantilever end.
3. Mark and match-mark materials for field assembly.
4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 3.

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened Pretensioned, or Slip critical as identified on the Drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

2.7 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize lintels, relieving angles, and other steel as shown on the Drawings.

2.8 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces .

B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:

1. SSPC-SP 3.

C. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.9 SOURCE QUALITY CONTROL

A. Special Inspections: City of New York will engage a qualified testing agency to perform shop tests and inspections.

1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
2. Bolted Connections: Inspect and test shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

    a. Liquid Penetrant Inspection: ASTM E165/E165M.
    b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
    c. Ultrasonic Inspection: ASTM E164.
    d. Radiographic Inspection: ASTM E94/E94M.

4. Testing agency to prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.

1. Do not remove temporary shoring supporting composite deck construction and structural-steel framing until cast-in-place concrete has attained its design compressive strength.

3.4 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.

B. Baseplates : Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Leveling plates are not permitted.
3. Weld plate washers to top of baseplate.
4. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
5. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.

C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Commissioner. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.5 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.

1. Joint Type: Pretensioned, or Slip-Critical as indicated on the Drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.
3. Do not begin structural welding until joint elements are inspected for surface preparation, fit-up, and cleanliness of surface to be welded and are then bolted or tacked in intimate contact and adjusted to dimensions shown on Drawings, or both, with allowance for any weld shrinkage that is expected. No members are to be spliced without prior approval by the Commissioner.
4. Pre-heat and interpass temperature must be in accordance with Table 4.2 (including footnotes) of the AWS Code for Welding in Building Construction. The temperature must be measured from the side opposite to that which the pre-heat is applied, where possible
5. All groove welds must be continuous and full penetration welds unless otherwise shown on the Contract Documents. Welds made without the aid of a back-up bar must have their roots chipped, ground or roughened out to sound metal from the second side, before welding is done from the second side.
6. All welds must be sound throughout. There must not be any crack in any weld or weld pass. Weld may be considered sound if it contains only slight porosity or fusion defects which are well dispersed.
7. The heat, input, length of weld and sequence of weld must be controlled to prevent distortions. The surfaces to be welded and the filler metals to be used will be subject to inspection before any welding is performed.

3.6 CORRECTIVE WORK

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.

B. Touchup Painting:

1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

3.7 FIELD QUALITY CONTROL

A. Special Inspections: City of New York will engage a qualified testing agency to perform the following special inspections:

1. Structural Steel - Welding (BC 1704.3.1)
2. Structural Steel - Details (BC 1704.3.2).
3. Structural Steel - High Strength Bolting (BC 1704.3.3).

B. Special Inspections: City of New York will engage a qualified testing agency to perform the following special inspections:

1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
3. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1) Liquid Penetrant Inspection: ASTM E165/E165M.
2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3) Ultrasonic Inspection: ASTM E164.

4. Shear Stud Connectors: In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
b. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

END OF SECTION 051200

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Exterior non-load-bearing wall framing.
2. Interior non-load-bearing wall framing for specialty clad walls.
3. Exterior soffit framing.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
2. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies, with height limitations.
3. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Cold-formed steel framing materials.
2. Exterior non-load-bearing wall framing.
3. Interior non-load-bearing wall framing.
4. Vertical deflection clips.
5. Single deflection track.
6. Soffit framing.
7. Post-installed anchors.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Engineering Services Submittal: For cold-formed steel framing, including analysis data signed and sealed by the qualified professional engineer licensed in the State of New York responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of code-compliance certification for studs and tracks.

C. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.

1. Steel sheet.
2. Expansion anchors.
3. Mechanical fasteners.
4. Vertical deflection clips.
5. Horizontal drift deflection clips
6. Miscellaneous structural clips and accessories.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, the Steel Stud Manufacturers Association, or Third-Party Certified Life Cycle Assessment: For each product

1. Mockups:Build mockups to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.Build mockup of each different exterior assembly 48 inches wide by 48 inches unless otherwise directed by Commissioner. Include intersections,, corners, and perimeters.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
4. In addition, furnish materials for installation in mockups specified in other sections.

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect and store cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling as required in AISI S202.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ClarkDietrich.
2. Jaimes Industries.
3. MarinoWARE.
4. Telling Industries.
5. Or approved equal.

2.2 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Drawings.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/600 of the wall height.

3. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

a. Upward and downward movement of 1 inch unless otherwise by performance requirements.

C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing complies with AISI S100 and AISI S240.

D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent unless otherwise indicated and required by project application.

B. Framing Members, General: Comply with AISI S240 for conditions indicated.

C. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: As required by structural performance.
2. Coating: G90 or equivalent.

D. Steel Sheet for Vertical Deflection and Drift Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G90.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch unless otherwise required by performance requirements.
2. Flange Width: As required to meet deflection criteria and manufacturers recommendations.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: Manufacturer's standard width.

C. Vertical Deflection Clips, Exterior: Manufacturer's standard bypass or head, clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch unless otherwise required by performance requirements.
2. Flange Width: 1 inch plus the design gap for one-story structures 1 inch plus twice the design gap for other applications.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

    a. Minimum Base-Metal Thickness: 0.0329 inch unless otherwise required by performance requirements.
    b. Flange Width: 1 inch plus the design gap for one-story structures 1 inch plus twice the design gap for other applications.

2. Inner Track: Of web depth indicated, and as follows:

    a. Minimum Base-Metal Thickness: 0.0428 inch unless otherwise required by performance requirements.
    b. Flange Width: Dimension equal to sum of outer deflection track flange width plus 1 inch.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 INTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch unless otherwise required by performance requirements.
2. Flange Width: 1-5/8 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips, Interior: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: 1 inch plus the design gap for one-story structures.

2.6 SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch unless otherwise required by performance requirements.
2. Flange Width: 1-5/8 inches, minimum.

2.7 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. End clips.
4. Stud kickers and knee braces.
5. Hole-reinforcing plates.
6. Backer plates.

2.8 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.

B. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report based on ICC-ES AC58 or ICC-ES AC308 as appropriate for the substrate.

1. Uses: Securing cold-formed steel framing to structure.
2. Type: adhesive anchor.
3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

C. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

D. Welding Electrodes: Comply with AWS standards.

2.9 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A780/A780M.

B. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.

C. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

2.10 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

   a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
   b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error are not to exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

3.4 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.5 INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated on Drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to bypassing or infill studs and anchor to building structure.
4. Connect drift clips to cold-formed steel framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at centers indicated on Shop Drawings.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 INSTALLATION OF INTERIOR NONLOAD BEARING WALL FRAMING

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated on Drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to studs and anchor to building structure.
4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at centers indicated on Shop Drawings.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.7 INSTALLATION TOLERANCES

A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error are not to exceed minimum fastening requirements of sheathing or other finishing materials.

3.8 CORRECTIVE WORK

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.9 FIELD QUALITY CONTROL

A. Special Inspections: City of New York will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Miscellaneous framing and supports.
2. Metal ladders.
3. Elevator pit sump covers.
4. Miscellaneous steel trim.
5. Loose bearing and leveling plates.
6. Screen and barrier assemblies including supports for rooftop mechanical equipment screening.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
3. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

C. Related Requirements:

1. Section 042000 "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
2. Section 051200 "Structural Steel Framing" for steel framing, supports, elevator machine beams, hoist beams, divider beams, door frames, and other steel items attached to the structural-steel framing.
3. Section 055113 "Metal Pan Stairs."
4. Section 055119 "Metal Grating Stairs.
5. Section 055213 "Pipe and Tube Railings."
6. Section 116623 "Gymnasium Equipment"for equipment to be supported.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data for the following:

1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Fasteners.
3. Shrinkage-resisting grout.
4. Slotted channel framing.
5. Manufactured metal ladders.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Miscellaneous framing and supports for applications where framing and supports are not specified in other Sections.
2. Steel shapes for supporting elevator door sills.
3. Metal ladders.
4. Metal floor plate and supports.
5. Elevator pit sump covers.
6. Miscellaneous steel trim including steel angle corner guards and steel edging.
7. Loose steel lintels.
8. Screen and barrier assemblies.

C. Engineering Services Submittals: For rooftop screen and barrier assemblies, including analysis data signed and sealed by the qualified professional engineer licensed in the State of New York who is responsible for their preparation.

D. Sustainable Design Submittals:

1. Environmental product declaration.
2. Environmental Product Declaration (EPD): For each product.
3. Health Product Declaration (HPD): For each product.
4. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

1.6 INFORMATIONAL SUBMITTALS

A. Mill Certificates: Signed by stainless steel manufacturers, certifying that products furnished comply with requirements.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

C. Engineering Services engineer qualifications.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer, licensed in the State of New York as defined in DDC General Conditions, to design rooftop screen and barrier assemblies.

B. Structural Performance of rooftop screen and barrier assemblies are to withstand the effects of loads and stresses within limits and under conditions specified in ANSI/ASC A14.3 and as indicated on structural drawings.

C. Thermal Movements for Exterior Metalwork: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Recycled Content: Provide manufacturer documentation for recycled content, indicating postconsumer and preconsumer recycled content.

C. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

D. Abrasive-Surface Floor Plate: Steel plate with abrasive material metallically bonded to steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Harsco Industrial IKG, a Division of Harsco Corporation.
b. Ohio Gratings, Inc.
c. W.S. Molnar Company.
d. Or approved equal.

2. Source Limitations: Obtain floor plate from single source from single manufacturer.

E. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.

F. Steel Pipe: ASTM A53/A53M, Standard Weight unless otherwise indicated.

G. Perforated Metal Panels: Aluminum sheet, ASTM B209 (ASTM B209M), Alloy 6061-T6, 0.063 inch thick, with 1/4-inch holes 3/8 inch o.c. in staggered rows.

H. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: 1-5/8 by 1-5/8 inches.
2. Galvanized Steel: ASTM A653/A653M, commercial steel, Type B structural steel, Grade 33, with G90 coating; 0.064-inch nominal thickness.

I. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

J. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.

K. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.

L. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.

M. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

N. Nickel Silver Extrusions: ASTM B151/B151M, Alloy UNS No. C74500.

O. Nickel Silver Castings: ASTM B584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless steel fasteners for fastening stainless steel.
2. Provide bronze fasteners for fastening bronze.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 1.

D. Post-Installed Anchors: .

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy stainless steel bolts, ASTM F593, and nuts, ASTM F594.

E. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

A. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

E. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts for units installed after concrete is placed.

C. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.7 METAL LADDERS

A. General:

1. Comply with ANSI A14.3, except for elevator pit ladders.
2. For elevator pit ladders, comply with ASME A17.1/CSA B44.
3. Fall Protection: Comply with OSHA Ladder Rule 1910.28(b)(3).

B. Steel Ladders:

1. Siderails: Continuous, 3/8-by-2-1/2-inch 1/2-by-2-1/2-inch steel flat bars, with eased edges.
2. Rungs: 3/4-inch- diameter or 3/4-inch- square, steel bars.
3. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.

4. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive, by using a type of manufactured rung filled with aluminum-oxide grout, or by coating with abrasive material metallically bonded to rung.
5. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung.

6. Source Limitations: Obtain nonslip surfaces from single source from single manufacturer.
7. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
8. Galvanize and prime exterior ladders, including brackets.
9. Prime interior ladders, including brackets and fasteners, with zinc-rich primer.

2.8 ELEVATOR PIT SUMP COVERS

A. Fabricate from welded or pressure-locked steel bar grating. Limit openings in gratings to no more than in least dimension.

B. Provide steel angle supports unless otherwise indicated.

2.9 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Prime interior miscellaneous steel trim to make it ready for field painting.

D. Prime exterior miscellaneous steel trim with zinc-rich primer. primer specified in Section 099611 "High-Performance Coatings."

2.10 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Prime plates with zinc-rich primer or primer specified in Section 099611 "High-Performance Coatings."

2.11 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches unless otherwise indicated.

2.12 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.13 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.14 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.15 ALUMINUM FINISHES

A. As-Fabricated Finish: AA-M12.

B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.

3.3 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for ceiling hung toilet partitions overhead grilles securely to, and rigidly brace from, building structure.

3.4 INSTALLATION OF METAL LADDERS

A. Secure ladders to adjacent construction with the clip angles attached to the stringer.

B. Install brackets as required for securing of ladders welded or bolted to structural steel or built into masonry or concrete.

3.5 INSTALLATION OF METAL FLOOR PLATE

A. Install metal floor plates flush with finished surface. Adjust as required to avoid lippage that could present a tripping hazard.

3.6 INSTALLATION OF ELEVATOR PIT SUMP COVERS

A. Install tops of elevator sump pit cover plates and frames flush with finished surface. Adjust as required to avoid lippage that could present a tripping hazard.

3.7 INSTALLATION OF LOOSE BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.8 CORRECTIVE WORK

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

   a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099123 "Interior Painting."

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055000

SECTION 055113 - METAL PAN STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Preassembled steel stairs with concrete-filled treads as indicated on drawings.

B. Related Requirements:

1. Section 051200 "Structural Steel Framing" for steel framing, supports and other steel items attached to the structural-steel framing.
2. Section 055000 "Metal Fabrications."
3. Section 055213 "Pipe and Tube Railings" for steel tube railings associated with metal pan stairs.
4. Section 057500 "Decorative Formed Metal."

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs.

1. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
2. Deliver such items to Project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so they do not encroach on required stair width and are within fire-resistance-rated stair enclosure.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For metal pan stairs and the following:

1. Abrasive nosing.
2. Grout.

B. Sustainable Design Submittals:

1. Environmental product declaration.
2. Environmental Product Declaration (EPD): For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.
2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
3. Include plan at each level.
4. Indicate locations of anchors, weld plates, and blocking for attachment of wall-mounted handrails.
5. Indicate profile and dimensions of precast terrazzo treads.
6. Indicate profile and dimensions of epoxy-resin-filled treads.

D. Samples for Verification: For each type and finish of nosing andprecast terrazzo tread.

E. Engineering Services Submittal: For stairs, , including analysis data signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer's experience with providing engineering services of the kind indicated, including documentation that engineer is licensed in New York State.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification.

1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.
2. Protect steel members and packaged materials from corrosion and deterioration.
3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.

a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering services: Engage a qualified professional engineer licensed in the State of New York as defined in DDC General Conditions, to design stairs, railings,, including attachment to building construction

B. Structural Performance of Stairs: Metal stairs withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform Load: 100 lbf/sq. ft..
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing and guard loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

C. Seismic Performance of Stairs: Metal stairs withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Component Importance Factor: 1.0.

2.2 METALS

A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

1. Recycled Content: Provide manufacturer documentation for recycled content, indicating postconsumer and preconsumer recycled content.

C. Uncoated, Cold-Rolled Steel Sheet: ASTM A1008/A1008M, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.

D. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011/A1011M, either commercial steel, Type B, orstructural steel, Grade 30, unless another grade is required by design loads.

E. Galvanized Steel Sheet: ASTM A653/A653M, G90 coating, either commercial steel, Type B, or structural steel, Grade 33, unless another grade is required by design loads.

F. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.

1. Recycled Content of Aluminum Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

G. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

1. Recycled Content of Aluminum Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.3 ABRASIVE NOSING

A. Extruded Units: units with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Safety Tread Co., Inc.
b. Amstep Products.
c. Wooster Products Inc.
d. Or approved equal.

2. Provide ribbed units, with abrasive filler strips projecting 1/16 inch above aluminum extrusion.
3. Nosing, Square-Back Units: 1-7/8 inches wide, without lip.

B. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.4 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B633 and Class Fe/Zn 5 where built into exterior walls.

1. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for stairs indicated to be shop primed with zinc-rich primer.

D. Post-Installed Anchors: chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

2.5 MISCELLANEOUS MATERIALS

A. Welding Electrodes: Comply with AWS requirements.

B. Zinc-Rich Primer: Comply with SSPC-Paint 20, Type II, Level 2, and compatible with topcoat.

C. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish system indicated.

D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with and compatible with paints specified to be used over it.

E. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for interior use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.

F. For galvanized reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.6 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Assemble stairs in shop to greatest extent possible.

1. Disassemble units only as necessary for shipping and handling limitations.
2. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 - No evidence of welded joint.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.

1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
2. Locate joints where least conspicuous.
3. Fabricate joints that will be exposed to weather in a manner to exclude water.
4. Provide weep holes where water may accumulate internally.

2.7 FABRICATION OF STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Architectural Class, unless more stringent requirements are indicated.

B. Stair Framing:

1. Stringers: Fabricate of steel plates or steel rectangular tubes as indicated on Drawings.

   a. Stringer Size: As required to comply with "Performance Requirements" Article.
   b. Provide closures for exposed ends of channel and rectangular tube stringers.
   c. Finish: Shop primed.

2. Platforms: Construct of steel plate or steel channel or steel rectangular tube headers and miscellaneous framing members as required to comply with "Performance Requirements" Article.

   a. Provide closures for exposed ends of channel and rectangular tube framing.
   b. Finish: Shop primed.

3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
4. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below.

   a. Locate hanger rods and struts where they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.

5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

C. Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch.

1. Steel Sheet, Uncoated: or-rolled steel sheet.
2. Galvanized Steel Sheet: Galvanized steel sheet where concrete -filled treads are used.
3. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
4. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.

    a. Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.

2.8 FINISHES

A. Finish metal stairs after assembly.

B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

C. Preparation for Shop Priming: Prepare uncoated, ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

D. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.

1. For wall-mounted railings, verify locations of concealed reinforcement within gypsum board and plaster assemblies.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF METAL PAN STAIRS

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.

1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

1. Grouted Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates.

a. Clean bottom surface of plates.
b. Set plates for structural members on wedges, shims, or setting nuts.
c. Tighten anchor bolts after supported members have been positioned and plumbed.
d. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
e. Promptly pack grout solidly between bearing surfaces and plates so no voids remain.

1) Neatly finish exposed surfaces; protect grout and allow to cure.
2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
3. Comply with requirements for welding in "Fabrication, General" Article.

F. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."

1. Install abrasive nosings with anchors fully embedded in concrete.
2. Center nosings on tread width.

G. Install precast terrazzo treads according to manufacturer's written instructions.

3.4 CORRECTIVE WORK

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

   a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099123 "Interior Painting

B. Repair of Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055113

SECTION 055119 - METAL GRATING STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Metal grating stairs including platforms at roof.

B. Related Requirements:

1. Section 051200 "Structural Steel Framing" for steel framing, supports and other steel items attached to the structural-steel framing.
2. Section 055000 "Metal Fabrications."
3. Section 055213 "Pipe and Tube Railings" for steel tube railings associated with grating stairs.

1.3 COORDINATION

A. Coordinate installation of anchorages for metal stairs.

1. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
2. Deliver such items to Project site in time for installation.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For metal grating stairs and the following:

1. Gratings.
2. Grout.

B. Sustainable Design Submittals:

1. Environmental product declaration.

2. Environmental Product Declaration (EPD): For each product.

C. Shop Drawings:

1. Include plans, elevations, sections, details, and attachment to other work.
2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
3. Include plan at each level.
4. Indicate locations of anchors, weld plates, and blocking for attachment of wall-mounted handrails.

D. Engineering Services Submittal: For stairs, railings, and guards, including analysis data signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer's experience with providing engineering services of the kind indicated, including documentation that engineer is licensed in the State of New York.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification.

1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.
2. Protect steel members and packaged materials from corrosion and deterioration.
3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.

a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined DDC General Conditions, to design stairs, including attachment to building construction.

B. Structural Performance of Stairs: Metal stairs withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform Load: 100 lbf/sq. ft..
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing and guard loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to L/360.

2.2 METALS

A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Steel Bars for Grating Treads: ASTM A36/A36M or steel strip, ASTM A1011/A1011M or ASTM A1018/A1018M.

D. Steel Wire Rod for Grating Crossbars: ASTM A510/A510M.

E. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

F. Cast-Abrasive Nosings: Cast iron, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both.

2.3 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM F1941/F1941M, Class Fe/Zn 12 for exterior use.

1. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for exterior stairs.

D. Post-Installed Anchors: capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.4 MISCELLANEOUS MATERIALS

A. Welding Electrodes: Comply with AWS requirements.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 ASTM A780/A780M and compatible with paints specified to be used over it.

C. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, guards, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Assemble stairs in shop to greatest extent possible.

1. Disassemble units only as necessary for shipping and handling limitations.
2. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish # 3 - Partially dressed weld with spatter removed.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.

1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
2. Locate joints where least conspicuous.
3. Fabricate joints that are exposed to weather in a manner to exclude water.
4. Provide weep holes where water may accumulate internally.

2.6 FABRICATION OF STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Industrial Class, unless more stringent requirements are indicated.

B. Stair Framing:

1. Fabricate stringers of steel plates channels.

a. Stringer Size: As required to comply with "Performance Requirements" Article.
b. Provide closures for exposed ends of channel stringers.
c. Finish: Galvanized.

2. Construct platforms and tread supports of steel plate channel headers and miscellaneous framing members as required to comply with "Performance Requirements" Article.

a. Provide closures for exposed ends of channel framing.
b. Finish: Galvanized.

3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers.

C. Metal Bar-Grating Stairs: Form treads and platforms to configurations shown from metal bar grating; fabricate to comply with NAAMM MBG 531, "Metal Bar Grating Manual."

1. Fabricate treads and platforms from welded steel or pressure-locked steel grating with openings in gratings no more than 1/2 inch in least dimension.

a. Surface: Serrated.
b. Finish: Galvanized.

2. Fabricate grating treads with rolled-steel floor plate nosing and with steel angle or steel plate carrier at each end for stringer connections.

a. Secure treads to stringers with bolts.

3. Fabricate grating platforms with nosing matching that on grating treads.

a. Secure grating to platform framing by welding.

D. Risers: Open.

E. Toe Plates: Provide toe plates around openings and at edge of open-sided platforms, and at open ends and open back edges of treads.

1. Material and Finish: Steel plate to match finish of other steel items unless otherwise directed by Commissioner.

2.7 FABRICATION OF STAIR RAILINGS AND GUARDS

A. Comply with applicable requirements in Section 055213 "Pipe and Tube Railings."

2.8 FINISHES

A. Finish metal stairs after assembly.

B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verify elevations of bearing surfaces and locations of bearing plates, and other embedment for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF METAL STAIRS

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.

1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

1. Grouted Baseplates: Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces.

a. Clean bottom surface of baseplates.

b. Set steel-stair baseplates on wedges, shims, or leveling nuts.
c. After stairs have been positioned and aligned, tighten anchor bolts.
d. Do not remove wedges or shims, but if protruding, cut off flush with edge of bearing plate before packing with grout.
e. Promptly pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

1) Neatly finish exposed surfaces; protect grout and allow to cure.
2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
3. Comply with requirements for welding in "Fabrication, General" Article.

3.4 CORRECTIVE WORK

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055119

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Interior steel railings for meat pan and precast concrete stairs.
2. Exterior guardrailing at roof.
3. Expanded metal panels.

B. Related Requirements:

1. Section 055113 "Metal Pan Stairs."
2. Section 055119 "Metal Grating Stairs."
3. Section 057300 "Decorative Metal Railings" for ornamental railings fabricated from pipes and tubes and guard-infill metals.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Expanded metal panels.
2. Fasteners.
3. Post-installed anchors.

4. Shop primer.
5. Bituminous paint.
6. Nonshrink, nonmetallic grout.
7. Metal finishes.
8. Paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters, including finish.
2. Fittings and brackets.
3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.

a. Show method of connecting and finishing members at intersections.

D. Engineering Services Submittal: For railings, including analysis data signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Product Test Reports: For tests on railings performed by a qualified testing agency, in accordance with ASTM E894 and ASTM E935.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces of railings from damage by applying a strippable, temporary protective covering before shipping.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer, licensed in the State of New York as defined in DDC General Conditions, to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.3 STEEL RAILINGS

A. Tubing: ASTM A500/A500M (cold formed) or ASTM A513/A513M, Type 5.

B. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations and where indicated.

C. Plates, Shapes, and Bars: ASTM A36/A36M.

D. Expanded Metal Panels: ASTM F1267 , Class 1 (uncoated).

1. Style Designation: 3/4 number 13 unless otherwise indicated.
2. Basis-of-Design Product: Subject to compliance with requirements, provide McNichols; products or comparable product by one of the following:

   a. Apex Iron Works.
   b. Grainger.
   c. Or approved equal.

2.4 FASTENERS

A. Fastener Materials:

1. Ungalvanized-Steel Railing Components: Plated steel fasteners complying with ASTM F1941/F1941M, Class Fe/Zn 5 for zinc coating.
2. Hot-Dip Galvanized Railing Components: Type 304 stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329/F2329M for zinc coating.
3. Finish exposed fasteners to match appearance, including color and texture, of railings.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
2. Provide Phillips tamper-resistant square or hex socket flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report, based on ICC-ES AC193.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.

1. For railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Galvanizing Repair Paint: High-zinc-dust-content paint, complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout, complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.

1. Clearly mark units for reassembly and coordinated installation.
2. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

F. Connections: Fabricate railings with welded or nonwelded connections unless otherwise indicated.

G. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint

H. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

1. Fabricate splice joints for field connection, using an epoxy structural adhesive, if this is manufacturer's standard splicing method.

I. Form changes in direction as follows:

1. As detailed.
2. By bending to smallest radius that will not result in distortion of railing member.

J. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

K. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.

L. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work.

1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
2. Coordinate anchorage devices with supporting structure.

O. For railing posts set in concrete, provide stainless steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

P. Expanded-Metal Infill Panels: Fabricate infill panels from expanded-metal sheet of same metal as railings.

1. Edge panels with U-shaped channels made from metal sheet, of same metal as expanded metal and not less than 0.043 inch thick.
2. Orient expanded metal with long dimension of diamondsas indicated on drawings.

2.7 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
2. Comply with ASTM A123/A123M for hot-dip galvanized railings.
3. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
4. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, hot-dip galvanize anchors to be embedded in exterior concrete or masonry.

D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3. requirements indicated below:

E. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1 for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated railings with universal shop primer unless zinc-rich primer is indicated.
2. Do not apply primer to galvanized surfaces.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.3 INSTALLATION, GENERAL

A. Perform cutting, drilling, and fitting required for installing railings.

1. Fit exposed connections together to form tight, hairline joints.
2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
4. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.4 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws, using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve, extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within 6 inches of post.

3.5 ANCHORING POSTS

A. Use stainless steel pipe sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with , mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Cover anchorage joint with flange of same metal as post, attached to post with setscrews.

C. Anchor posts to metal surfaces with flanges, angle type, or floor type, as required by conditions, connected to posts and to metal supporting members as follows:

1. For steel railings, weld flanges to post and bolt to metal supporting surfaces.
2. For aluminum railings, attach posts as indicated, using fittings designed and engineered for this purpose.
3. For stainless steel railings, weld flanges to post and bolt to supporting surfaces.

D. Install removable railing sections, where indicated, in slip-fit stainless steel sockets cast in concrete.

3.6 ATTACHING RAILINGS

A. Anchor railing ends to concrete and masonry with sleeves concealed within railing ends and anchored to wall construction with anchors and bolts.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing endsor connected to railing ends, using nonwelded connections.

C. Attach handrails to walls with wall brackets, except where end flanges are used. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface.

1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

D. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.7 CORRECTIVE WORK

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099123 "Interior Painting."

3.8 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 055213

SECTION 057300 - DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Exterior stainless steel railings.
2. Exterior steel decorative railings.

B. Related Requirements:

1. Section 033000 "Cast in Place Concrete."
2. Section 044200 "Exterior Stonework" for exterior stone stairs.
3. Section 321313 "Concrete Paving" for concrete paving.

1.3 COORDINATION AND SCHEDULING

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver items to Project site in time for installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data:

1. Manufacturer's product lines of decorative metal railings assembled from standard components.
2. Fasteners.

3. Post-installed anchors.
4. Bituminous paint.
5. Nonshrink, nonmetallic grout.
6. Anchoring cement.
7. Metal finishes.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

C. Shop Drawings: Include plans, elevations, sections, and attachment details.

1. For exterior steel decorative railings, provide complete details of handrail construction, sleeves for posts, height, post spacing layout, dimensions and concrete footing detail.

D. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. One 12 inch long sample section of galvanized, powdercoated steel tube and steel bar.

   a. At the Commissioner's discretion, a sample of the TGIC powder coated handrail must be laboratory tested for bonding of the powder coating to the metal. Testing method must be the Cross Hatch test in compliance with ASTM D3359, method B. Failure to satisfactorily pass this test must be a basis for rejection.

3. Fittings.
4. Welded connections.
5. Assembled Sample of railing system, made from full-size components, including top rail, post, and handrail. Sample need not be full height.

E. Engineering Services Submittal: For railings, including analysis data signed and sealed by the qualified, New York State licensed professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Mill Certificates: Signed by manufacturers of stainless steel products, certifying that products furnished comply with requirements.

C. Welding certificates.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

E. Product Test Reports: For tests on railings performed by a qualified testing agency, in accordance with ASTM E894 and ASTM E935.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockups for each form and finish of railing, consisting of two posts, top rail,and anchorage system components that are full height and are not less than 24 inches in length.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces of railings from damage by applying a strippable, temporary protective covering before shipping.

1.10 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, are to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

C. Comply with the most recent edition of the Americans with Disabilities Act (ADA), and provisions described in ANSI A117.1-2009.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior railings by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

2.3 STAINLESS STEEL RAILINGS

A. Tubing: ASTM A554, Grade MT 316.

B. Pipe: ASTM A312/A312M, Grade TP 316.

C. Castings: ASTM A743/A743M, Grade CF 8M or CF 3M.

D. Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 316.

E. Flat Bar: ASTM A666, Type 316.

F. Bars and Shapes: ASTM A276/A276M, Type 316.

2.4 STEEL DECORATIVE RAILINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Architectural Iron Designs, Inc.
2. Greco, a CSW Industrials Company.
3. Lawler Foundry Corporation.
4. Or approved equal.

B. Source Limitations: Obtain steel decorative railing components from single source from single manufacturer.

C. Recycled Content of Steel Products (Where Required): Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

D. Tubing: ASTM A1011/A1011M (cold formed) with a minimum of 0.9 ounces of zinc per square foot, and a minimum of of 15 micrograms of zinc chromate per square inch.

1. Tubing must have a minimum yield strength of 50,000 psi.
2. Provide rectangulat steel tube sleeves in dimensions indicated on the Drawings.

E. Plates, Shapes, and Bars: ASTM A36/A36M, solid, and of dimensions indicated on the Drawings.

2.5 FASTENERS

A. Fastener Materials:

1. Stainless Steel Railing Components: Type 316 stainless steel fasteners.
2. Hot-Dip Galvanized-Steel Railing Components: Type 304 stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329/F2329M for zinc coating.
3. Dissimilar Metal Railing Components: Type 316 stainless steel fasteners.
4. Finish exposed fasteners to match appearance, including color and texture, of railings.

B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction and capable of withstanding design loads.

C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless exposed fasteners are unavoidable.

1. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, in accordance with an evaluation report acceptable to Commissioner, based on ICC-ES AC193 .

1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy stainless steel bolts, ASTM F593 and nuts, ASTM F594.

2.6 MISCELLANEOUS MATERIALS

A. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

C. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.
2. Powder Coated Decorative Steel Railings: Provide anchoring cement composed of one part cement and two parts sand, as approved by the Commissioner.

a. Color: To match adjacent stone or pavement.

2.7 FABRICATION

A. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.

1. Clearly mark units for reassembly and coordinated installation.
2. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water.

1. Provide weep holes where water may accumulate.
2. Locate weep holes in inconspicuous locations.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded or mechanical connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint.

I. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings.

1. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
2. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

J. Form changes in direction as follows:

1. As detailed, or
2. By bending to smallest radius that will not result in distortion of railing member.

K. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.

M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch or less.

N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, handrail brackets, miscellaneous fittings, and anchors to interconnect railing members to other Work unless otherwise indicated.

O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry Work.

1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
2. Coordinate anchorage devices with supporting structure.

P. For railing posts set in concrete, provide stainless steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

2.8 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. All components of powder coated steel decorative railings must be galvanized, phosphatized chromated and powder coated on all surfaces.

E. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.9 STAINLESS STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces.
3. Remove embedded foreign matter and leave surfaces chemically clean.

C. Stainless Steel Tubing Finishes:

1. 180-Grit Polished Finish: Uniform, directionally textured finish.

D. Stainless Steel Sheet and Plate Finishes:

1. Directional Satin Finish: ASTM A480/A480M, No. 4.

2.10 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanized exterior steel railings, including hardware, after fabrication.
2. Comply with ASTM A123/A123M for hot-dip galvanized railings.
3. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
4. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
5. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. TGIC Polyster Powder-Coat Finish for Galvanized Metal: Comply with AAMA 2603. Prepare, treat, and coat galvanized metal to comply with resin manufacturer's written instructions and as follows:

1. Prepare galvanized metal by thoroughly removing grease, dirt, oil, flux, and other foreign matter.
2. Treat prepared metal with phosphatizing and chromatizing pretreatment, rinse, and seal surfaces with sealer compatible with powder coating to ensure proper adhesion.
3. Apply electrostatic sprayed, thermosetting triglycidyl isocianurate powder coating with cured-film thickness of not less than 3-6 mils.
4. Apply TGIC coating without voids, tears, or cuts that reveal the substrate, and thoroughly adhere to metal without peeling, without scratching with a pick device or knife blade point.

PART 3 - Color: Black.EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION, GENERAL

A. Perform cutting, drilling, and fitting required for installing railings.

1. Fit exposed connections together to form tight, hairline joints.
2. Install railings plumb, square, true to line; without distortion, warp, or rack.
3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.

4. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Powder Coated Decorative Steel Handrails: Holes must be drilled into substrates by approved core drilling methods and equipment. Holes must be of size and depths indicated on the Drawings, as required by local conditions, or as directed by the Commissioner. Damage to existing substrates resulting from drilling operations must be repaired by the Contractor at Contractor's cost and expense.

C. Powder coated decorative steel handrails must be set in holes formed in steps or footings as indicated on the Drawings or as directed by the Commissioner.

1. Install sleeves for posts where indicated on the Drawings or as directed by the Commissioner.
2. Set posts in place or in sleeves and support to hold to line or grade.
3. Fill voids with grout consisting of one part cement and two parts sand.
4. Color of grout must match surrounding pavement or stone.

D. Cover anchorage joint with flange of same metal as post, attached to post with setscrews.

E. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For stainless steel railings, weld flanges to posts and bolt to metal-supporting surfaces.
2. For steel railings, weld flanges to posts and bolt to metal-supporting surfaces.

3.5 ATTACHING RAILINGS

A. Anchor exterior railings in sleeves for posts where indicated on the Drawings or as directed by the Commissioner.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends or connected to railing ends, using nonwelded connections.

3.6 CORRECTIVE WORK

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

a. Apply by brush or spray to provide a minimum 3.0-mil dry film thickness. Touch-up must not be visible from a distance of six feet.

3.7 CLEANING

A. Clean stainless steel by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M. Galvanizing repair paint must have 65 percent zinc by weight.Thickness of repair paint must not be less than required by ASTM A123.

3.8 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 057300

SECTION 057500 - DECORATIVE FORMED METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Closures and trim.
2. Filler panels.
3. Stainless steel mirrors.

1.3 COORDINATION

A. Coordinate installation of anchorages for decorative formed metal items. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver items to Project site in time for installation.

B. Coordinate installation of decorative formed metal with adjacent construction to ensure that wall assemblies, flashings, trim, and joint sealants, are protected against damage from the effects of weather, age, corrosion, and other causes of deterioration.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product, including finishing materials including stainless steel mirrors.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

C. Shop Drawings: Show fabrication and installation details for decorative formed metal including stainless steel mirrors.

1. Include plans, elevations, component details, and attachment details.
2. Indicate materials and profiles of each decorative formed metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.

D. Samples for Verification: For each type of exposed finish required, prepared on 6-inch- square Samples of metal of same thickness and material indicated for the Work.

1.7 INFORMATIONAL SUBMITTALS

A. Mill Certificates: Signed by stainless-steel manufacturers certifying that products furnished comply with requirements.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver decorative formed metal products wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.

B. Store products on elevated platforms in a dry location.

1.10 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls, columns, beams, and other construction contiguous with decorative formed metal by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Decorative formed metal items, including anchors and connections, are to withstand the effects of gravity loads and the following loads and stresses without exceeding the allowable design working stress of materials involved and without exhibiting permanent deformation in any components:

1. Wind Loads on Exterior Items: As indicated on Drawings.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METAL

A. General: Fabricate products from sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections where exposed to view on finished units.

B. Aluminum Sheet: Flat sheet complying with ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties of not less than Alloy 5005-H32.

C. Steel Sheet: Uncoated, cold-rolled, ASTM A 1008/A 1008M, commercial steel, exposed orelectrolytic zinc-coated, ASTM A 879/A 879M, with steel sheet substrate complying with ASTM A 1008/A 1008M, commercial steel, exposed.

D. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, except Type 316 for exterior locations, stretcher-leveled standard of flatness.

2.3 STAINLESS STEEL MIRRORS

A. Material and Finish: Mirror stainless steel sheet 8+, Type 304, 0.9 mm thick.

1. Mirror finishes achieved by either mechanically polishing or chemically polishing process.
2. Polish Grade: Super Bright with no grain unless otherwise indicated.

B. Size: As indicated on drawings.

2.4 MISCELLANEOUS MATERIALS

A. Gaskets: As required to seal joints in decorative formed metal and remain weathertight; as recommended in writing by decorative formed metal manufacturer.

1. ASTM D 1056, Type 1, Class A, grade as recommended by gasket manufacturer to obtain seal for application indicated.
2. Closed-cell polyurethane foam, adhesive on two sides, release paper protected.

B. Sealants, Exterior: ASTM C 920; elastomeric silicone or polysulfide sealant; of type, grade, class, and use classifications required to seal joints in decorative formed metal and remain weathertight; and as recommended in writing by decorative formed metal manufacturer.

C. Sealants, Interior: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834; of type and grade required to seal joints in decorative formed metal; and as recommended in writing by decorative formed metal manufacturer.

D. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated. Do not use metals that are incompatible with materials joined.

1. Provide concealed fasteners for interconnecting decorative formed metal items and for attaching them to other work unless exposed fasteners are unavoidable or are the standard fastening method.

2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

E. Nonstructural Anchors: For applications not indicated to comply with design loads, provide fastener systems with an evaluation report based on ICC-ES AC193 or ICC-ES AC308.

F. Anchor Materials:

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

G. Sound-Deadening Materials:

1. Mastic: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

H. Backing Materials: Provided or recommended by decorative formed metal manufacturer.

I. Laminating Adhesive: Adhesive recommended by metal fabricator that will fully bond metal to metal, will prevent telegraphing and oil-canning, and is compatible with substrate and noncombustible after curing.

J. Isolation Coating: Manufacturer's standard bituminous paint.

2.5 PAINTS AND COATINGS

A. Epoxy Zinc-Rich Primer: Compatible with topcoat.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble decorative formed metal items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Coordinate dimensions and attachment methods of decorative formed metal items with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.

C. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush surfaces without cracking or grain separation at bends. Fold back exposed edges of unsupported sheet metal to form a 1/2-inch- wide hem on the concealed side, or ease edges to a radius of approximately 1/32 inch and support with concealed stiffeners.

D. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide surface flatness equivalent to stretcher-leveled standard of flatness and sufficient strength for indicated use.

1. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.

E. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce decorative formed metal items as needed to attach and support other construction.

F. Provide support framing, mounting and attachment clips, splice sleeves, fasteners, and accessories needed to install decorative formed metal items.

G. Where welding or brazing is indicated, weld or braze joints and seams continuously. Grind, fill, and dress to produce smooth, flush, exposed surfaces in which joints are not visible after finishing is completed.

1. Use welding and brazing procedures that will blend with and not cause discoloration of metal being joined.

2.7 CLOSURES AND TRIM

A. Form closures and trim from metal of type and thickness indicated below. Fabricate to fit tightly to adjoining construction, with weathertight joints at exterior installations.

1. Aluminum Sheet: Minimum 0.063 inch unless otherwise required to comply with performance requirements .

a. Finish: Baked enamel or powder coat.

2. Steel Sheet:0.048 inch unless otherwise required to comply with performance requirements.

a. Finish: Factory primed.

3. Closures and trim may be fabricated from prefinished metal sheet in lieu of finishing after fabrication provided unfinished edges are concealed from view and not exposed to weather.

B. Conceal fasteners where possible; otherwise, locate where they are as inconspicuous as possible. Size fasteners to support closures and trim, with fasteners spaced to prevent buckling or waviness in finished surfaces.

C. Drill and tap holes needed for securing closures and trim to other surfaces.

D. Incorporate gaskets where indicated or needed for concealed, continuous seal at abutting surfaces.

E. Miter or cope trim members at corners and reinforce with bent metal splice plates to form tight joints.

2.8 FILLER PANELS

A. Form filler panels for closing ends of partition systems and for other applications indicated. Form from two sheets of metal of type and thickness indicated below, separated by channels formed from the same material, producing a panel of same thickness as partitions and mullions unless otherwise indicated. Incorporate reveals, trim, and concealed anchorages for attaching to adjacent surfaces.

1. Steel Sheet: 0.060 inch minimum .

a. Finish: Factory primed .

2. Filler panels may be fabricated from prefinished metal sheet in lieu of finishing after fabrication provided unfinished edges are concealed from view.

B. Fill interior of panel with sound-deadening insulation permanently attached to inside panel faces.

C. Adhesively attach gaskets to filler panel edges where they abut mullions or glazing. Use 1-inch- square material, unless otherwise indicated, set approximately 1/4 inch into channeled edge of filler panel.

D. Attach gaskets to all edges of panels that abut adjacent surfaces to form a continuous seal. Use compressible gaskets or mastic sealing tape, applied to center of panel edges to be concealed from view, unless otherwise indicated.

E. Do not mechanically fasten filler panels to mullions.

2.9 GENERAL FINISH REQUIREMENTS

A. Complete mechanical finishes of flat sheet metal surfaces before fabrication where possible. After fabrication, finish all joints, bends, abrasions, and other surface blemishes to match sheet finish.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.10 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, or thicker.

B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color and Gloss: As selected by Commissioner from manufacturer's full range.

2.11 STEEL SHEET FINISHES

A. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or with SSPC-SP 8, "Pickling."

B. Pretreatment: Immediately after cleaning, apply a conversion coating of type suited to organic coating.

C. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply shop primer to prepared surfaces of items unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

2.12 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

C. Directional Satin Finish: No. 4.

D. Mirrorlike Reflective, Nondirectional Polish: No. 8 finish.

E. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative formed metal.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Locate and place decorative formed metal items level and plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install decorative formed metal.

1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.

B. Install stainless steel mirrors in accordance with approved shop drawings.

C. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where needed to protect metal surfaces and to make a weathertight connection.

D. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.

E. Install concealed gaskets, joint fillers, insulation, sealants, and flashings, as the Work progresses, to make exterior decorative formed metal items weatherproof.

F. Install concealed gaskets, joint fillers, sealants, and insulation, as the Work progresses, to make interior decorative formed metal items soundproof or lightproof as applicable to type of fabrication indicated.

G. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.

3.4 ADJUSTING AND CLEANING

A. Unless otherwise indicated, clean metals by washing thoroughly with water and soap, rinsing with clean water, and drying with soft cloths.

B. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

   a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

C. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

3.5 PROTECTION

A. Protect finishes of decorative formed metal items from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

END OF SECTION 057500

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Wood-preservative-treated lumber.
2. Fire-retardant-treated lumber.
3. Miscellaneous lumber.
4. Plywood backing panels.

B. Related Requirements:

1. Section 061600 "Sheathing" for sheathing.

1.3 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Lumber grading agencies, and abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. SPIB: The Southern Pine Inspection Bureau.
4. WCLIB: West Coast Lumber Inspection Bureau.
5. WWPA: Western Wood Products Association.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

B. Sustainable Design Submittals:

1. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
2. Product Data: For installation adhesives, indicating VOC content.
3. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.

1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1, Use categories as follows:

1. UC1: Interior construction not in contact with ground or subject to moisture. Include the following items:

a. Wood sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
b. Wood millwork.

2. UC2: Interior construction not in contact with ground but may be subject to moisture. Include the following items:

a. Wood sills, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
b. Wood flooring.

3. For exposed items indicated to receive a stained or natural finish, chemical formulations are not to require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
4. After treatment, redry boards to 19 percent maximum moisture content.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each pieceor omit marking and provide certificates of treatment compliance issued by inspection agency.

2.2 FIRE-RETARDANT-TREATED LUMBER

A. General: Where fire-retardant-treated materials are indicated, materials are to comply with requirements in this article, that are acceptable to Commissioner and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Treatment is not to promote corrosion of metal fasteners.
2. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.

C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each pieceor omit marking and provide certificates of treatment compliance issued by testing agency.

E. For exposed items indicated to receive a stained or natural finish, chemical formulations are not to bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat items indicated on Drawings, and the following:

1. Concealed blocking.
2. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
3. Plywood backing panels.

2.3 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Furring.
5. Utility shelving.

B. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

C. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.5 FASTENERS

A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or ASTM F2329.

B. Post-Installed Anchors: Fastener systems with an evaluation report based on ICC-ES AC58 ICC-ES AC308 as appropriate for the substrate.

2.6 MISCELLANEOUS MATERIALS

A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

1. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

C. Provide blocking as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

D. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

E. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

F. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

G. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in ICC's International Building Code (IBC).

H. Securely attach roofing nailers to substrates by anchoring and fastening to withstand bending, shear, or other stresses imparted by Project wind loads and fastener-resistance loads as designed in accordance with ASCE/SEI 7.

I. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.3 INSTALLATION OF WOOD BLOCKING AND NAILERS

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach wood blocking to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.4 INSTALLATION OF WOOD FURRING

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- size furring horizontally and vertically at 24 inches o.c.

C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- size furring vertically at 16 inches o.c.

END OF SECTION 061000

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Sheathing joint and penetration treatment materials.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for plywood backing panels.
2. Section 061800 "Glued-Laminated and Cross-Laminated Construction" for roof sheathing.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Wall sheathing.
2. Sheathing joint-and-penetration treatment materials.

B. Product Data Submittals: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested in accordance with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WALL SHEATHING

A. Glass-Mat Gypsum Sheathing, Walls: ASTM C1177/C1177M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Certainteed; SAINT-GOBAIN
b. Continental Building Products, LLC.
c. Georgia-Pacific Gypsum LLC.
d. USG Corporation.
e. Or approved equal.

2. Type and Thickness: Type X, 5/8 inch thick.

2.3 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

B. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.

1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C1002.
2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C954.

2.4 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as required by NYC Building Code.

D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.3 INSTALLATION OF GYPSUM SHEATHING

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to cold-formed metal framing with screws.
2. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
3. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.
2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.
2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

E. Seal sheathing joints in accordance with sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.

END OF SECTION 061600

SECTION 061800 - GLUED-LAMINATED AND CROSS-LAMINATED CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Structural glued-laminated timber.
2. Timber connectors.
3. Cross Laminated Timber

B. Related Requirements:

1. Section 051200 Structural Steel.

1.3 DEFINITIONS

A. Structural Glued-Laminated (Glulam) Timber: An engineered, stress-rated timber product assembled from selected and prepared wood laminations bonded together with adhesives and with the grain of the laminations approximately parallel longitudinally.

B. Cross Laminated Timber (CLT): An engineered, stress-rated timber panel product assembled from selected and prepared wood laminations bonded together in a alternating pattern with each layer of boards oriented perpendicular to the adjacent layers.

1.4 SUSTAINABILITY REQUIREMENTS

A. The Contractor is to implement practices and procedures to meet the Project's Sustainable Design goals, which include achieving LEED Gold. The Contractor must ensure that the requirements related to these goals, as defined in this Section and in Related Sections of the Contract Documents, are implemented. Substitutions, or other changes to the Work proposed by the Contractor or their Subcontractors, must not be allowed if such changes compromise the Project's Sustainable Design goals.

B. The Contractor is to efficiently use resources and energy while executing the Work of this Section. Resource efficient aspects to be considered in completing this Project include the use of techniques that minimize waste generation, reuse of construction materials on site where possible, and recycling of waste generated during the construction process.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data on lumber, adhesives, fabrication, and protection.
2. For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
3. For connectors. Include installation instructions.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Laboratory Test Reports: For laminating adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings:

1. Glulam:

a. Show layout of structural glued-laminated timber system and full dimensions of each member.
b. Indicate species, material grade, appearance grade, and laminating combination.
c. Include large-scale details of connection details showing all associated hardware.
d. Show all glulam beam penetrations as required.

2. CLT:

a. Show layout of CLT with dimensions of each panel extent.
b. Indicate species, material grade, appearance grade, and laminating combination.
c. Fabrication and erection details including cuts, holes, and fastenings.
d. Show all connection details and associated hardware.

D. Samples: Full width and depth, 24 inches long, showing the range of variation to be expected in appearance of structural glued-laminated timber including variations due to specified treatment.

E. Engineering Services Submittal: For structural glued-laminated timber and timber connectors. For connections where the design forces are shown in the contract documents, these must be designed by a professional engineer licensed in the state of New York working for the CLT and/or Glulam fabricator. All connections must have a 1-hour fire rating protection (min.). Engineering services submittals, including drawings, calculations and reports, are to be signed and sealed by the professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Certificates of Conformance: Issued by a qualified testing and inspecting agency indicating that structural glued-laminated timber complies with requirements in ANSI A190.1 and the CLT complies with the requirements of ANSI/APA PRG 320.

B. Material Certificates: For preservative-treated wood products, from manufacturer. Indicate type of preservative used and net amount of preservative retained.

C. Research/Evaluation Reports: For structural glued-laminated timber, CLT, and timber connectors from ICC-ES.

D. Moisture Protection Plan per the requirements of Section 1.9.

E. Handling, storage, and installation plan per the requirements of Section 1.9.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/1.

C. Fabricator Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/2.

D. Manufacturer Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/5 and that is an AITC- or APA-EWS-licensed firm.

1.9 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with provisions in AITC 111.

B. Moisture Protection Plan to be provided as well as handling, storage, and installation plan prior to construction for the Commissioner to review. This must include the planned protection for the glulam and CLT material prior to installation, during installation, and after installation. The Contractor and timber supplier and timber installer are to have a preconstruction kickoff meeting with the Commissioner to review the following for the project:

1. Handling, Storage, and Installation Plan.
2. Moisture Protection Plan.
3. Seal coating and end-coating requirements for structural members. Coating in-shop and in-field where needed.
4. Procedural and timeline requirements to resolve construction issues during erection.
5. Damage mitigation and repair procedures for any structural members damaged (moisture or physical) during construction.
6. Warranty information and maintenance plans.

C. All materials for the work of this Section must be delivered, stored and handled so as to preclude damage of any nature.

D. All materials must be stored level on the site and must be raised off the ground, stacked using separating spacers, and covered with waterproof material.

E. Individually wrap members using plastic-coated paper covering with water-resistant seams. The wrapping must be slit on the underside to prevent accumulation of condensation.

F. Members that will be exposed to view in the finished building must be handled using nylon or fabric slings to prevent surface damage.

G. At the completion of timber erection and the building enclosure, the building must be transitioned to a condition space at a gradual rate to allow for a gradual drying of the timber and regulation of the moisture content of the timber to prevent checking of the timber structure.

H. If materials are to be located at the job site for extended periods of time, further protection from the elements must be provided by the Contractor. The Contractor must have a protection plan in place for stored and installed materials in the event construction ceases operations for extended periods of time.

1.10 WARRANTY

A. Warranty: Manufacturer warrants that glued-laminated and cross-laminated timber elements will meet specified requirements and agrees to provide components and materials for repair or replacement of products that fail to perform as specified within warranty period.

B. Warranty Period: 1 year minimum from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design structural glued-laminated timber and connectors.

B. Structural Performance: Structural glued-laminated timber and connectors are to withstand the effects of structural loads shown on Drawings without exceeding allowable design working stresses listed in ANSI 117 or determined according to ASTM D3737 and acceptable to Commissioner.

C. Seismic Performance: Structural glued-laminated timber and connectors are to withstand the effects of earthquake motions determined according to ASCE 7.

2.2 STRUCTURAL GLUED-LAMINATED TIMBER

A. General: Provide structural glued-laminated timber that complies with ANSI A190.1 and ANSI 117 or research/evaluation reports acceptable to Commissioner.

1. Factory mark each piece of structural glued-laminated timber with AITC Quality Mark or APA-EWS trademark. Place mark on surfaces that are not exposed in the completed Work.
2. Provide structural glued-laminated timber made from single species.
3. Provide structural glued-laminated timber made from solid lumber laminations; do not use laminated veneer lumber.
4. Provide structural glued-laminated timber made with wet-use adhesive complying with ANSI A190.1.
5. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Species and Grades For Glulam:

1. Species: To be determined with Manufacturer, submit for Commissioner's review prior to selection of mass timber provider.
2. Beam Stress Grade: 24F-1.8E.
3. Column Min Fc (Compressive strength parallel to grain): 1600 psi
4. Lay-up: Unbalanced for Simple Span Conditions, Balanced for cantilever of continuous beams.
5. Adhesive: Complying with AITC 405
6. Sealer: Per Manufacturer standard - to be transparent and compatible with finish
7. Appearance Classification: Industrial where architecturally concealed, Architectural where architecturally exposed, complying with AITC 110.

C. Species and Grades for CLT:

1. Species: To be determined with Manufacturer, submit for Commissioner's review prior to selection of mass timber provider.
2. CLT Stress Grade: E1, E2, or E4, to be confirmed with CLT provider.
3. Adhesive: Complying with ANSI/APA PRG 320
4. Sealer: Per Manufacturer standard - to be transparent and compatible with finish
5. Appearance Classification: Industrial where architecturally concealed, Architectural where architecturally exposed, complying with AITC 110.

2.3 TIMBER CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Rothoblaas.
2. Simpson Strong-Tie Co., Inc.
3. MTC Solutions.
4. Or approved equal.

B. Fabricate tie rods from round steel bars with upset threads connected with forged-steel turnbuckles complying with ASTM A668/A668M.

C. Provide bolts, 3/4 inch unless otherwise indicated, complying with ASTM A307, Grade A; nuts complying with ASTM A563; and, where indicated, flat washers. Bolts to be zinc coated for interior applications and hot dipped galvanized for exterior applications.

D. Materials: Unless otherwise indicated, fabricate from the following materials:

1. Structural-steel shapes, plates, and flat bars complying with ASTM A36/A36M.
2. Round steel bars complying with ASTM A575, Grade M 1020.
3. Hot-rolled steel sheet complying with ASTM A1011/A1011M, Structural Steel, Type SS, Grade 33.

E. Finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil dry film thickness.

F. Hot-dip galvanize exterior steel assemblies and fasteners after fabrication to comply with ASTM A123/A123M or ASTM A153/A153M.

2.4 MISCELLANEOUS MATERIALS

A. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.

B. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

2.5 FABRICATION

A. Shop fabricate for connections to greatest extent possible, including cutting to length and drilling bolt holes.

1. Dress exposed surfaces as needed to remove planing and surfacing marks.

B. Camber: Fabricate horizontal and inclined members of less than 1:1 slope with either circular or parabolic camber equal to 1/500 of span.

C. End-Cut Sealing: Immediately after end cutting each member to final length, apply a saturation coat of end sealer to ends and other cross-cut surfaces, keeping surfaces flood coated for not less than 10 minutes.

D. Seal Coat: After fabricating, sanding, and end-coat sealing, apply a heavy saturation coat of penetrating sealer on surfaces of each unit.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Prior to fabrication, check all dimensions relating to this section of work. Report any discrepancies to commissioner.

B. Prior to site erection, examine all site conditions to ensure an acceptable condition.

C. Erect members in accordance with approved shop drawings.

D. Erect decking in accordance with the drawings in a single- or multiple-span continuous pattern as indicated on the drawings (no controlled random pattern).

E. Members must be properly braced and kept plumb until the complete structural system has been constructed. Contractor must retain a Professional Engineer licensed in the State of New York to ensure that all structural lumber and connections will sustain any erection loadings that may occur with an adequate factor of safety.

3.3 EXAMINATION

A. Examine substrates in areas to receive structural glued-laminated timber, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.4 INSTALLATION

A. General: Erect structural glued-laminated timber true and plumb and with uniform, close-fitting joints. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.

1. Handle and temporarily support glued-laminated timber to prevent surface damage, compression, and other effects that might interfere with indicated finish.

B. Prior to fabrication, check all dimensions relating to this section of work. Report any discrepancies to commissioner.

C. Prior to site erection, examine all site conditions to ensure an acceptable condition.

D. Erect members in accordance with approved shop drawings.

E. Erect decking in accordance with the drawings in a single- or multiple-span continuous pattern as indicated on the drawings (no controlled random pattern).

F. Framing Built into Masonry: Provide 1/2-inch clearance at tops, sides, and ends of members built into masonry; bevel cut ends 3 inches; and do not embed more than 4 inches unless otherwise indicated.

G. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, submit to the Commissioner for reviewing the location and the cutting procedure is to comply with requirements for shop fabrication.

H. Fit structural glued-laminated timber by cutting and restoring exposed surfaces to match specified surfacing and finishing.

1. Predrill for fasteners using timber connectors as templates.

2. Finish exposed surfaces to remove planing or surfacing marks and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
3. Coat cross cuts with end sealer.

I. Install timber connectors as indicated.

1. Unless otherwise indicated, install bolts with same orientation within each connection and in similar connections.
2. Install bolts with orientation as indicated or, if not indicated, as directed by Commissioner.

3.5 ADJUSTING

A. Repair damaged surfaces after completing erection. Repair procedures must be submitted to comissioner for approval. Structural members are to be re-coated as required in-field after sanding is used for repair, or where coating has been damanged. Replace damaged structural glued-laminated and cross-laminated timber if repairs are not approved by Commissioner.

B. Where glued-laminated and cross-laminated timber members are required to be made dry as part of repair procedure, building finishes must not be installed until drying is completed to a moisture content approved by the Commissioner.

3.6 PROTECTION

A. Do not remove wrappings on individually wrapped members until they no longer serve a useful purpose, including protection from weather, sunlight, soiling, and damage from work of other trades.

1. Coordinate wrapping removal with finishing work. Retain wrapping where it can serve as a painting shield.
2. Slit underside of wrapping to prevent accumulation of moisture inside the wrapping.

END OF SECTION 061800

SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Wood benches, Cubbies, and Lobby desk.
2. Plastic-laminate cladding for millwork and cabintry.
3. Solid surface countertops.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
2. Section 064113 "Wood-veneer-faced Architectural Cabinets" for hardware.
3. Section 099123 "Interior Painting" for priming and backpriming of interior finish carpentry.

1.3 DEFINITIONS

A. MDF: Medium-density fiberboard.

B. MDO: Plywood with a medium-density overlay on the face.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Plastic-laminate.
2. Adhesives.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.

2. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
3. Product Data: For installation adhesives, indicating VOC content.
4. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For architectural wood benches and reception desk.

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in architectural cabinets.

D. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.

E. Samples: For each exposed product and for each color and texture specified.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.

1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
2. Provide for air circulation around stacks and under coverings.

B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of architectural cabinets indicated for construction, finishes, installation, and other requirements.

1. The Contract Documents contain requirements that are more stringent than the referenced woodwork quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

B. Composite Wood Products: Products must be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or must be made with no added formaldehyde.

C. Softwood Plywood: DOC PS 1.

D. Hardboard: ANSI A135.4.

E. MDF: ANSI A208.2, Grade 130.

2.2 WOOD BENCHES, CUBBIES, AND LOBBY DESK

A. Softwood Lumber Trim for Transparent Finish (Stain or Clear Finish):

1. Species and Grade: As indicated on drawings and selected by Commissioner; unless otherwise indicated.

B. Hardwood Lumber for Transparent Finish (Stain or Clear Finish):

1. Species and Grade: As indicated on drawings and selected by Commissioner; NHLA Clear unless otherwise indicated.
2. Maximum Moisture Content: 10 percent.
3. Finger Jointing: Not allowed.
4. Face Surface: Surfaced (smooth).
5. Matching: Selected for compatible grain and color.

C. Lumber for Opaque Finish (Painted Finish):

1. Species and Grade: As indicated on drawings and selected by Commissioner.
2. Maximum Moisture Content: 15 percent.

2.3 PLASTIC-LAMINATE CLADDING

A. High-Pressure Decorative Laminate: ISO 4586-3/NEMA LD3, grades as indicated or if not indicated, as required by quality standard.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Wilsonart or comparable product by one of the following:

    a. Arborite.
    b. Formica.
    c. Panolam Industries International, Inc.
    d. Or approved equal.

B. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces as indicated on drawings or selected by Commissioner.

C. Exposed Surfaces: Plastic-Laminate Grade: HGS and VGS as required by project application.

2.4 SOLID SURFACE COUNTERTOPS

A. Solid- Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

B. General: Use only adhesives and grouts formulated for simulated stone or solid- surfacing material and that are recommended by the manufacturer for the application indicated.

1. Water- Cleanable Epoxy Adhesive and Grout: ANSI A118.3, with a VOC content of 65 g/L or less; chemical-resistant, water-cleanable, tile-setting and -grouting epoxy.
2. Manufacturers: Subject to compliance with requirements, provide products from one of the following:

    a. Custom Building Products.
    b. Laticrete International, Inc.
    c. MAPEI Corporation.
    d. Mer-Krete Systems.
    e. Prospec; Bonsal American; a division of Oldcastle Architectural Products Group.
    f. Or approved equal.

C. Construct countertops with 1-1/2 inches thickness at front, back, and ends using added layers of same substrate material laminated to topside with exterior glue unless otherwise indicated.

D. Backsplash and Edge Construction, where used: Integral to countertop.

2.5 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

B. Adhesive for Bonding Plastic Laminate: Type II water-resistant type as selected by fabricator to comply with requirements.

C. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

1. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Multipurpose Construction Adhesive: Formulation, complying with ASTM D 3498, that is recommended for indicated use by adhesive manufacturer.

1. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.6 FABRICATION

A. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.4 INSTALLATION, GENERAL

A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.

1. Use concealed shims where necessary for alignment.
2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

C. Adhere plastic laminate material in accordance with product manufacturers instructions to achieve complete bond to substrate.

3.5 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements.

1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

B. Adjust joinery for uniform appearance.

3.6 CLEANING

A. Clean interior finish carpentry on exposed and semiexposed surfaces.

B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.7 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 062023

SECTION 064113 - WOOD-VENEER-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Wood cabinets for transparent finish.
2. Wood cabinets for opaque finish.
3. Wood materials.
4. Fire-retardant-treated material.
5. Cabinet hardware and accessories.
6. Miscellaneous materials.
7. Shop finishing.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
2. Section 062023 "Interior Finish Carpentry."

1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data:

1. Wood cabinets for transparent finish.

2. Wood cabinets for opaque finish.
3. Wood materials.
4. Fire-retardant-treated material.
5. Cabinet hardware and accessories.
6. Miscellaneous materials.
7. Shop finishing.

B. Product Data Submittals : For each product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

C. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

D. Shop Drawings: For architectural cabinets.

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in architectural cabinets.
5. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.

1.7 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of product. inclusive of the following:

1. Composite wood products.
2. Thermally fused laminate panels.
3. Adhesives.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of typical architectural cabinets as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.10 FIELD CONDITIONS

A. Environmental Limitations without Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 CABINETS, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of architectural cabinets indicated for construction, finishes, installation, and other requirements.

1. The Contract Documents contain requirements that are more stringent than the referenced woodwork quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

2.2 WOOD CABINETS FOR TRANSPARENT FINISH

A. Architectural Woodwork Standards Grade: Premium.

B. Type of Construction: Frameless.

C. Door and Drawer-Front Style: Flush overlay.

D. Wood for Exposed Surfaces: Unless otherwise indicated on Drawings.

1. Species: White oak.
2. Blueprint Matching: Comply with veneer and other matching requirements indicated for blueprint-matched paneling.
3. Cut: Plain sliced/plain sawn.
4. Grain Direction: As indicated on Drawings.
5. Matching of Veneer Leaves: Random match.
6. Veneer Matching within Panel Face: Running match.
7. Veneer Matching within Room: Provide cabinet veneers in each room or other space from a single flitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.

E. Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces.

2. Drawer Subfronts, Backs, and Sides: Solid-hardwood lumber.
3. Drawer Bottoms: Hardwood plywood.

F. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.

G. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

2.3 WOOD CABINETS FOR OPAQUE FINISH

A. Architectural Woodwork Standards Grade: Premium.

B. Type of Construction: Frameless.

C. Door and Drawer-Front Style: Flush overlay.

D. Species for Exposed Lumber Surfaces: Any closed-grain hardwood.

E. Panel Product for Exposed Surfaces: MDF.

F. Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Match materials indicated for exposed surfaces.

a. Edges of Thermally Fused Laminate Panel Shelves: PVC or polyester edge banding.

2. Drawer Sides and Backs: Solid-hardwood lumber.
3. Drawer Bottoms: Hardwood plywood.

G. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.

H. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

2.4 WOOD MATERIALS

A. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
2. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
3. Thermally Fused Laminate (TFL) Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of ISO 4586.

2.5 FIRE-RETARDANT-TREATED MATERIAL

A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials with required fire-test-response characteristics, as determined by testing identical products per test method indicated by a qualified testing agency.

1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.
2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Kiln-dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.
2. For items indicated to receive a stained or natural finish, use organic resin chemical formulation.
3. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking shop certified by testing and inspecting agency.
4. Mill lumber before treatment and implement procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of architectural cabinets.

2.6 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets and interior finish carpentry.

1. Basis of Design Products: Subject to compliance with requirements, provide products by Richeliu or comparable by one of the following:

   a. Accuride International.
   b. Blum, Julius & Co., Inc.
   c. Grass America Inc.
   d. Hafele.
   e. Hardware Resources.
   f. Or approved equal.

B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 135 degrees of opening, self-closing.

C. Pulls, Modern Style Edge Pull: Solid aluminum 3/32 inch thick; 2 1/16 inches wide by 5 1/32 long.

1. Finish: Manufacturers standard stainless steel.

D. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141 Push-in magnetic catches, ANSI/BHMA A156.9, B03131.

E. Shelf Rests: ANSI/BHMA A156.9, B04013; two-pin plastic with shelf hold-down clip.

F. Drawer Slides: ANSI/BHMA A156.9.

1. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): Side mount.

a. Type: Full overtravel extension.
b. Material: Stainless steel slides.
c. Motion Feature: Push to open.

2. General purpose drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide 75 lb load capacity.
3. Computer keyboard tray, provide 75 lb load capacity.

G. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.

H. Grommets for Cable Passage: 1-1/4-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Color: Black unless otherwise indicated .

I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for BHMA finish number indicated.

1. Satin Brass, Blackened, Bright Relieved, Clear Coated: ANSI/BHMA 610 for brass base; ANSI/BHMA 636 for steel base.
2. Satin Stainless Steel: ANSI/BHMA 630.

J. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.7 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.8 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate architectural cabinets to dimensions, profiles, and details indicated. Ease edges and corners to 1/16-inch radius unless otherwise indicated.

C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Commissioner seven days in advance of the dates and times architectural cabinet fabrication will be complete.
2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

E. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual."

1. For glass in wood frames, secure glass with removable stops.
2. For exposed glass edges, polish and grind smooth.

2.9 SHOP FINISHING

A. Shop finish transparent-finished architectural cabinets at manufacturer's shop as specified in this Section. See Section 099123 "Interior Painting" for field finishing of opaque-finished architectural cabinets.

B. Shop Priming: Shop apply the prime coat including backpriming, if any, for items specified to be field finished. See Section 099123 "Interior Painting" for material and application requirements.

C. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural cabinets, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinets.

D. Transparent Finish:

1. Architectural Woodwork Standards Grade: Premium.
2. Finish System - 5, conversion varnish 12, water-based polyurethane.
3. Staining, where indicated: Match approved sample for color.
4. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D523.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.3 INSTALLATION

A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.

B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with cabinet surface.

1. For shop-finished items, use filler matching finish of items being installed.

D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.

1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
3. Maintain veneer sequence matching of cabinets with transparent finish.
4. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish ortoggle bolts through metal backing or metal framing behind wall finish.

E. Shop Finishes: Touch up finishing after installation of architectural cabinets and benches. Fill nail holes with matching filler.

1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

F. Field Finishing: See Section 099123 "Interior Painting" for finishing of installed architectural cabinets.

3.4 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets and benches , where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets and benches on exposed and semiexposed surfaces. Touch up finishes to restore damaged or soiled areas.

END OF SECTION 064113

SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Blindside sheet waterproofing.
2. Post applied sheet waterproofing
3. Molded-sheet drainage panels.

B. Related Requirements:

1. Section 072100 "Thermal Insulation."
2. Section 033000 "Cast-In-Place Concrete"

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.
2. Review transitions within waterproofing system and between waterproofing and adjacent air barrier.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
2. Include manufacturer's written installation instructions for evaluating, preparing, and treating substrate.

B. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, air barrier, and other termination conditions.

C. Samples: For each product, including the following materials:

1. 8-by-8-inch square of waterproofing and flashing sheet.
2. 4-by-4-inch square of drainage panel.

1.6 INFORMATIONAL SUBMITTALS

A. Research Reports: For modified bituminous sheet waterproofing/termite barrier, showing compliance with ICC-ES AC380.

B. Field quality-control reports.

C. Qualification Statements: For Installer.

D. Sample warranties.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/1, and that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.8 MOCKUPS

A. Build mockups as required by Commissioner to verify selections made under Sample submittals and to set quality standards for installation.

1. Build mockups for each typical waterproofing installation including accessories to demonstrate surface preparation, crack and joint treatments, inside and outside corner treatments, and protection.

a. Size: As indicated on Drawings.
b. Description: Each type of wall and slab installation.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to frozen, damp, or wet substrates.

1. Do not apply waterproofing when snow, rain, fog, or mist is present.

B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.10 COORDINATION

A. Coordinate Work under this Section with adjacent concrete foundation work, including fill, other waterproofing systems , under-slab vapor retarders , under-slab insulation and , subdrainage systems.

B. Coordinate requirements for concrete formwork to provide suitable substrate for waterproofing and to minimize penetrations through waterproofing.

C. Coordinate formwork and form bracing requirements for blindside sheet waterproofing. Coordinate restrictions on use of form ties and other components as necessary to eliminate or minimize penetrations through blindside sheet waterproofing.

1.11 WARRANTY

A. Manufacturer's Warranty:

1. Waterproofing Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

a. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Waterproofing System: Obtain waterproofing materials, protection course molded-sheet drainage panels insulation drainage panels from single source from single manufacturer.

2.2 BLINDSIDE SHEET WATERPROOFING

A. Blindside Sheet Waterproofing for Vertical Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond with fresh concrete placed against it; complete with accessories and preformed shapes for an unbroken waterproofing assembly; with the physical properties as specified below:

1. Basis-of-Design Product: Subject to compliance with requirements, provide GCP Technologies Preprufe 300R Plus Membrane system or comparable products by one of the following:

    a. CETCO is a subsidiary of Minerals Technologies Inc.
    b. Soprema, Inc.
    c. Or approved equal.

2. Physical Properties:

    a. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D1970/D1970M.
    b. Peel Adhesion to Concrete: 5 lbf/in. minimum; ASTM D903, modified.
    c. Lap Adhesion: 5 lbf/in. minimum; ASTM D1876, modified.
    d. Hydrostatic-Head Resistance: 230 ft.; ASTM D5385/D5385M, modified.
    e. Puncture Resistance: 100 lbf minimum; ASTM E154/E154M.
    f. Water Vapor Permeance: 0.1 perm maximum; ASTM E96/E96M, Water Method.
    g. Ultimate Elongation: 335 percent minimum; ASTM D412, modified.

B. Blindside Sheet Waterproofing for Horizontal Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond with fresh concrete placed against it; complete with accessories and preformed shapes for an unbroken waterproofing assembly; with the physical properties as specified below:

1. Basis-of-Design Product: Subject to compliance with requirements, provide GCP Technologies Preprufe 300R Plus Membrane system or comparable products by one of the following:

    a. CETCO is a subsidiary of Minerals Technologies Inc.
    b. Soprema, Inc.
    c. Or approved equal.

2. Physical Properties:

    a. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D1970/D1970M.
    b. Peel Adhesion to Concrete: 5 lbf/in. minimum; ASTM D903, modified.
    c. Lap Adhesion: 5 lbf/in. minimum; ASTM D1876, modified.
    d. Hydrostatic-Head Resistance: 230 ft.; ASTM D5385/D5385M, modified.
    e. Puncture Resistance: 200 lbf minimum; ASTM E154/E154M.
    f. Water Vapor Permeance: 0.1 perm maximum; ASTM E96/E96M, Water Method.
    g. Ultimate Elongation: 335 percent minimum; ASTM D412, modified.

C. Mastic, Adhesives, and Detail Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

2.3 POST-APPLIED SHEET WATERPROOFING

A. Post Applied Sheet Waterproofing for Vertical Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond to concrete when applied with adhesive primer; complete with accessories and preformed shapes for an unbroken waterproofing assembly; with the physical properties as specified below:

1. Basis of Design Product: Subject to compliance with requirements, provide GCP Technologies; Preprufe 800PA or comparable product by one of the following:

    a. CETCO is a subsidiary of Minerals Technologies Inc.
    b. Soprema, Inc.
    c. Or approved equal.

2. Physical Properties:

    a. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D1970/D1970M.
    b. Peel Adhesion to Concrete: 5 lbf/in. (875 N/m) minimum; ASTM D903, modified.
    c. Lap Adhesion: 5 lbf/in. (875 N/m) minimum; ASTM D1876, modified.
    d. Hydrostatic-Head Resistance: 230 ft. (70 m); ASTM D5385/D5385M, modified.
    e. Puncture Resistance: 100 lbf (445 N) minimum; ASTM E154/E154M.
    f. Water Vapor Permeance: 0.1 perm (6 ng/Pa x s x sq. m) maximum; ASTM E96/E96M, Water Method.
    g. Ultimate Elongation: 335 percent minimum; ASTM D412, modified.

2.4 MOLDED-SHEET DRAINAGE PANELS

A. Molded-Sheet Drainage Panel with Polymeric Film, Nonwoven-Geotextile Faced: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate through the core of 9 to 21 gpm per ft..

1. Basis-of-Design Product: Subject to compliance with requirements, provide GCP Technologies Hydroduct 200 or equivalent products by one of the following:

    a. CETCO is a subsidiary of Minerals Technologies Inc.
    b. Soprema, Inc.
    c. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of waterproofing.

1. Verify that concrete has cured and aged for minimum time recommended in writing by waterproofing manufacturer.

2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263.
3. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.
4. Verify compacted subgrade is of aggregate size no larger than 3/4" with no sharp or projecting edges.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean, prepare, and treat substrates in accordance with manufacturer's written installation instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections.

E. Fill form tie holes, honeycomb, aggregate pockets, holes, and other voids.

F. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks in accordance with ASTM D4258.

1. Install sheet strips of width in accordance with manufacturer's written installation instructions and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.

G. Bridge and cover isolation joints, expansion joints, and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips of widths in accordance with manufacturer's written installation instructions.

1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

H. Corners: Prepare, prime, and treat inside and outside corners in accordance with manufacturer's written installation instructions.

1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:

a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
b. At plaza-deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.

I. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.

3.4 INSTALLATION OF BLINDSIDE SHEET WATERPROOFING

A. Install blindside sheet waterproofing in accordance with manufacturer's written installation instructions, Contract Documents and NRCA (WM) applicable requirements.

B. Place and secure molded-sheet drainage panels over substrate. Lap edges and ends of geotextile to maintain continuity.

C. Vertical Applications: Install sheet with face against substrate. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by membrane manufacturer. Overlap and seal seams, and stagger and tape end laps to ensure watertight installation. Mechanically fasten to substrate.

1. Securely fasten top termination of membrane with continuous metal termination bar anchored into substrate and cover with detail tape.
2. Ensure transition with other waterproofing membrane.

D. Horizontal Applications: Install sheet with face against substrate. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by membrane manufacturer. Overlap and seal seams, and stagger and tape end laps to ensure watertight installation.

E. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.

F. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.

G. Install sheet waterproofing and accessory materials to produce a continuous watertight tie into adjacent waterproofing.

H. Re-examine membrane and joints after rebar and other trades have completed work. Report and repair all damaged or compromised areas.

I. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.

3.5 INSTALLATION OF POST APPLIED SHEET WATERPROOFING

A. Install post applied sheet waterproofing in accordance with manufacturer's written installation instructions, Contract Documents and NRCA (WM) applicable requirements.

B. Apply all recommended primers at coverage rates and with dry times in accordance with manufacturer’s written instructions

C. Apply membrane in lengths recommended by manufacturer. Overlap all seams per manufacturer recommendations. On higher walls apply membrane in two or more sections with the upper overlapping the lower per manufacturer recommendations, Roll all membrane with a hand roller or in a manner recommended by manufacturer.

1. Ensure transition with other waterproofing membrane.

D. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.

E. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.

F. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches (150 mm) beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.

3.6 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, in accordance with manufacturer's written installation instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

1. For vertical applications, install board insulation before installing drainage panels.

3.7 FIELD QUALITY CONTROL

A. Inspect membranes after the installation of the reinforcing steel prior to the setting of the interior forms and the pouring of concrete.

B. Flood Testing: Flood test each deck area for leaks, in accordance with recommendations in ASTM D5957, after completing waterproofing but before placing overlying construction. Install temporary containment assemblies, plug or dam drains, and flood with potable water.

1. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and a maximum depth of 4 inches. Maintain 2 inches of clearance from top of sheet flashings.
2. Flood each area for 48 hours.
3. BECA will observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.
4. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.

   a. Cost of retesting is Contractor's responsibility.

5. BECA will prepare survey report indicating locations of initial leaks, if any, and final survey report.

C. Waterproofing will be considered defective if it does not pass tests and inspections.

3.8 PROTECTION, REPAIR, AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 071326

SECTION 071416 - COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Polyurethane-type waterproofing at inside surfaces of detention tanks.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review waterproofing requirements including, but not limited to, the following:

a. Surface preparation specified in other Sections.
b. Minimum curing period.
c. Forecasted weather conditions.
d. Special details and sheet flashings.
e. Repairs.
f. Field quality control.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

B. Shop Drawings:

1. Indicate locations and extent of waterproofing.
2. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

3. Include setting drawings indicating layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.

C. Samples: For each exposed product and for each color and texture specified, including the following products:

1. Flashing sheet, 8 by 8 inches.
2. Membrane-reinforcing fabric, 8 by 8 inches.

D. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 MOCKUPS

A. Build mockups to verify selections made under Sample submittals and to set quality standards for installation.

1. Build mockup for each typical waterproofing installation, including accessories to demonstrate surface preparation, crack and joint treatments, inside and outside corner treatments, and protection.

a. Size: 100 sq. ft. in area.
b. Description: Each type of installation.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer.

1. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.
2. Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are imminent during application and curing period.

B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.10 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain waterproofing materials from single source and from single manufacturer.

2.2 POLYURETHANE WATERPROOFING

A. Reinforced, Polyurethane Waterproofing: ASTM C836/C836M.

B. PMMA Based-Resin Waterproofing: High performance two-component, poly methyl-methacrylate with catalyst reinforced with polyester fleece layer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Alt Global.
b. Soprema.
c. Kemper Systems.
d. Or approved equal.

2. Catalyst: Peroxide-based reactive agent used to induce curing of PMMA-based resins.
3. Reinforcing Sheet: 360 degree needle punched non-woven 110 grams per square meter minimum polyester reinforcing fleece, for a minimum finished dry film membrane minimum thickness of 90 mil, or greater if required by manufacturer
4. Primer: Two-component, solvent free PMMA-based resin for use in improving adhesion of membrane to substrate surface. Monitor application rate and adjust depending on substrate absorbency.
5. Alternate Epoxy Vapor Retarder/Primer: For use where approved by membrane system manufacturer.
6. Flashing Membrane: Manufacturers standard product.
7. Product Characteristics:

a. Water Vapor Permeance: 0.003 perm, maximum, ASTM E96/E96M.
b. Tensile Strength: As indicated by manufacturers product designation; ASTM D638.
c. Elongation at Break: As indicated by manufacturers product designation; ASTM D638.

C. PUMA Waterproofing: Two-component, polyurethane-methacrylate; ASTM C1305 or STPE Waterproofing: Single-component, silyl-terminated polyether complying with ASTM C836/C836Mwith the following properties measured in accordance with standard test methods referenced:

1. Tensile Strength: 900 psi (6.2 MPa) minimum; ASTM D638.
2. Elongation at Break: 400 percent minimum; ASTM D638.
3. Water Vapor Permeance: 0.003 perm(0.172 ng/Pa x s x sq. m), maximum, ASTM E96/E96M.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Henry Company.
    b. Tremco Incorporated.
    c. W.R. Meadows, Inc.
    d. Or approved equal.

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials recommended in writing by waterproofing manufacturer for intended use and compatible with one another and with waterproofing.

    1. Furnish liquid-type auxiliary materials that comply with VOC limits.

B. Primer: Manufacturer's standard primer, sealer, or surface conditioner; factory-formulated.

C. Membrane-Reinforcing Fabric: Manufacturer's recommended fiberglass mesh or polyester fabric, manufacturer's standard weight.

D. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.

E. Joint Sealant: Multicomponent polyurethane sealant, compatible with waterproofing; ASTM C920, Type M, Class 25 or greater; Grade NS for sloping and vertical applications and Grade P for deck applications; Use NT exposure; and as recommended by manufacturer for substrate and joint conditions.

    1. Backer Rod: Closed-cell polyethylene foam.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

    1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
    2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean, prepare, and treat substrates in accordance with manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.

D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.

1. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate in accordance with ASTM D4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces in accordance with ASTM D4258.

E. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.

3.4 PREPARATION AT TERMINATIONS, PENETRATIONS, AND CORNERS

A. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, sleeves, and corners in accordance with waterproofing manufacturer's written instructions and to recommendations in ASTM C898/C898M and ASTM C1471/C1471M.

B. Apply waterproofing in two separate applications, and embed a joint reinforcing strip in the first preparation coat when recommended by waterproofing manufacturer.

3.5 JOINT AND CRACK TREATMENT

A. Prepare, treat, rout, and fill joints and cracks in substrate in accordance with waterproofing manufacturer's written instructions and to recommendations in ASTM C898/C898M and ASTM C1471/C1471M. Before coating surfaces, remove dust and dirt from joints and cracks in accordance with ASTM D4258.

1. Comply with ASTM C1193 for joint-sealant installation.
2. Apply bond breaker on sealant surface, beneath preparation strip.
3. Prime substrate along each side of joint and apply a single thickness of preparation strip at least 6 inches wide along each side of joint. Apply waterproofing in two separate applications and embed a joint reinforcing strip in the first preparation coat.

B. Install sheet flashing and bond to deck and wall substrates where required in accordance with waterproofing manufacturer's written instructions.

1. Extend sheet flashings for 4 inches onto perpendicular surfaces and items penetrating substrate.

3.6 INSTALLATION OF WATERPROOFING

A. ExteApply waterproofing in accordance with manufacturer's written instructions and to recommendations in ASTM C898/C898M and ASTM C1471/C1471M.

B. Start installing waterproofing in presence of manufacturer's technical representative.

C. Apply primer over prepared substrate unless otherwise instructed in writing by waterproofing manufacturer.

D. Reinforced Waterproofing Applications: Mix materials and apply waterproofing by roller, notched squeegee, trowel, or other suitable application method.

1. Apply first coat of waterproofing, embed membrane-reinforcing fabric, and apply second coat of waterproofing to completely saturate reinforcing fabric and to obtain a seamless reinforced membrane free of entrapped gases and pinholes, with an average dry film total thickness of 120 mils.
2. Apply reinforced waterproofing to prepared wall terminations and vertical surfaces.
3. Verify manufacturer's recommended wet film thickness of waterproofing every 100 sq. ft..

E. Cure waterproofing, taking care to prevent contamination and damage during application and curing.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: If required by manufacturer, engage a qualified testing agency to perform tests and inspections:

1. Testing agency to verify thickness of waterproofing during application for each 600 sq. ft. of installed waterproofing or part thereof.
2. Contractor to provide Testing Agency 1 week notice prior to required thickness testing.

B. Manufacturer's Field Service: Engage a full-time site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components and to furnish daily reports to Commissioner.

C. Waterproofing will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.8 PROTECTION

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

END OF SECTION 071416

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board insulation.
2. Polyisocyanurate foam-plastic board insulation.
3. Mineral-wool blanket insulation.
4. Mineral-wool board insulation.

B. Related Requirements:

1. Section 042000 "Unit Masonry" for insulation retaining masonry ties .

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Extruded polystyrene foam-plastic board insulation.
2. Polyisocyanurate foam-plastic board insulation.
3. Mineral-wool blanket insulation.
4. Mineral-wool board insulation.

B. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
2. Health Product Declaration: For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
4. Health Product Declaration (HPD): Provide documentation indicating that manufacturer has screened and publicly provided ingredient disclosure to 1000 ppm, and has developed an action plan to mitigate known hazards.
5. Health Product Declaration (HPD): Provide documentation indicating that manufacturer has screened and publicly provided ingredient disclosure to 1000 ppm, and has developed an action plan to mitigate known hazards.

6. Product Data: For adhesives, indicating VOC content.
7. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
8. Laboratory Test Reports: For insulation, indicating compliance with requirements for low-emitting materials.

1.5 INFORMATIONAL SUBMITTALS

A. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.

1. For blown-in or sprayed fiberglass and cellulosic-fiber loose-fill insulation, indicate initial installed thickness, settled thickness, settled R-value, installed density, coverage area, and number of bags installed.
2. Sign, date, and post the certification in a conspicuous location on Project site.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Research Reports: For foam-plastic insulation, from ICC-ES.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 MOCKUPS

A. Build mockups as required by Commissioner to verify selections made under Sample submittals and to set quality standards for installation.

1. Build integrated mockups of exterior wall assembly as diagrammed on A-350, incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations.

   a. Coordinate construction of mockups to permit inspection and testing of insulation before external cladding is installed.
   b. If Commissioner determines mockups do not comply with requirements, reconstruct mockups and apply insulation until mockups are approved.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations by Change Order.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes less than 25 and 450 when tested in accordance with ASTM E84.

B. Fire-Resistance Ratings: Comply with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from listings of another qualified testing agency.

C. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

D. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

E. Thermal-Resistance Value (R-Value): R-value as indicated on Drawings in accordance with ASTM C518.

F. Insulation must comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

G. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

1. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
2. Adhesives must have a VOC content of 70 g/L or less.

2.2 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

A. Extruded Polystyrene Board Insulation, Type IV INSUL-05: ASTM C578, Type IV, 25-psi minimum compressive strength; unfaced.

1. Basis-of-Design Product: Subject to compliance with requirements, provide SOPREMA; SOPRA-XPS or comparable product by one of the following:

a. Dow Chemical Company (The).
b. DuPont de Nemours, Inc.
c. Owens Corning.
d. Or approved equal.

B. Extruded Polystyrene Board Insulation, Type IV, Concrete faced: ASTM C578, Type IV, 25-psi minimum compressive strength; prefaced with concrete cement board,

1. Basis-of-Design Product: Subject to compliance with requirements, provide T Clear; Wall Guard or comparable product by one of the following:

a. Tech-Crete
b. Amvic Building system
c. PermaBASE
d. Or approved equal.

C. Extruded Polystyrene Board Insulation, Type VII INSUL-01: ASTM C578, Type VII, 60-psi minimum compressive strength.

1. Basis-of-Design Product: Subject to compliance with requirements, provide SOPREMA; SOPRA-XPS or comparable product by one of the following:

a. Dow Chemical Company (The).
b. DuPont de Nemours, Inc.
c. Owens Corning.
d. Or approved equal.

2.3 POLYISOCYANURATE FOAM-PLASTIC BOARD INSULATION

A. Polyisocyanurate Board Insulation, Glass-Fiber-Mat Faced INSUL-02: ASTM C1289, glass-fiber-mat faced, Type II, Class 1, Grade 3 (25 psi).

1. Basis-of-Design Product: Subject to compliance with requirements, provide Siplast; Paratherm G or comparable product by one of the following:

a. Atlas Molded Products; a Division of Atlas Roofing Corporation.
b. Hunter Panels.
c. Johns Manville; a Berkshire Hathaway company.
d. Rmax, Inc.
e. Soprema Inc.
f. Or approved equal.

2.4 MINERAL-WOOL BLANKET INSULATION

A. Mineral-Wool Blanket Insulation, Unfaced INSUL-03: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; passing ASTM E136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Rockwool International.
c. Thermafiber, Inc.; an Owens Corning company.
d. Or approved equal.

2.5 MINERAL-WOOL BOARD INSULATION

A. Mineral-Wool Board Insulation, Types IA and IB, Unfaced INSUL-04: ASTM C612, Types IA and IB; passing ASTM E136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Rockwool International.
c. Thermafiber, Inc.; an Owens Corning company.
d. Or approved equal.

2.6 INSULATION FASTENERS

A. Masonry Wing Nut Anchors With Retaining Washer : (see 042000 Unit Masonry)

B. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AGM Industries, Inc.
b. Gemco.
c. GLT Products
d. Or approved equal.

2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.

C. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Gemco.
b. GLT Products
c. AGM Industries Inc.
d. Or approved equal.

2. Angle: Formed from 0.030-inch- thick, perforated, galvanized carbon-steel sheet with each leg 2 inches square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.

D. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AGM Industries, Inc.
b. Gemco.
c. GLT Products
d. Or approved equal.

2. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:

a. Crawl spaces.
b. Ceiling plenums.
c. Attic spaces.
d. Soffits.

2.7 ACCESSORIES

A. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.4 INSTALLATION OF SLAB INSULATION

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive in accordance with manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units in accordance with manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

3.5 INSTALLATION OF FOUNDATION WALL INSULATION

A. Butt panels together for tight fit.

B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive in accordance with anchor manufacturer's written instructions.
2. Space anchors in accordance with insulation manufacturer's written instructions for insulation type, thickness, and application.
3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation.
4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing in accordance with manufacturer's written instructions.

3.6 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer.

1. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
2. Press units firmly against inside substrates.
3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

B. Mineral-Wool Board Insulation: Install insulation fasteners 4 inches from each corner of board insulation, at center of board, and as recommended by manufacturer.

1. Fit courses of insulation between masonry wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
2. Press units firmly against inside substrates.

3.7 INSTALLATION OF CURTAIN-WALL INSULATION

A. Install board insulation in curtain-wall construction in accordance with curtain-wall manufacturer's written instructions.

1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass.
2. Maintain cavity width of dimension indicated on Drawings between insulation and glass.
3. Install insulation to fit snugly without bowing.

3.8 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072715 - NONBITUMINOUS SELF-ADHERING SHEET AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes: Self-adhering air barrier.

1. Vapor-permeable nonbituminous sheet.

B. Related Requirements:

1. Section 042000 - Unit Masonry
2. Section 071326 - Self-Adhering Sheet Waterproofing
3. Section 075600 - Cold Liquid Applied (PMMA) Hybrid Membrane Roofing
4. Section 079200 - Joint Sealants
5. Section 076200 - Sheet Metal Flashing and Trim
6. Section 084413 - Glazed Aluminum Curtain Walls

1.3 DEFINITIONS

A. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

B. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

C. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: Self-adhering air barrier. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; and tested physical and performance properties of products.

1. Vapor-permeable nonbituminous sheet.

B. Shop Drawings: For air-barrier assemblies.

1. Show locations and extent of air-barrier materials, accessories, and assemblies specific to Project conditions.
2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
3. Include details of interfaces with other materials that form part of air barrier.

1.7 INFORMATIONAL SUBMITTALS

A. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with air barrier.

B. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

C. Field quality-control reports.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/1 and that employs installers and supervisors who are trained and approved by manufacturer.

C. Mockups: Build mockups to set quality standards for materials and execution and for preconstruction testing.

1. Build integrated mockups of exterior wall assembly as diagrammed on A-350, incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.

a. Coordinate construction of mockups to permit inspection and testing of air barrier before external insulation and cladding are installed.
b. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
c. If Commissioner determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on field mockups.

B. Mockup Testing: Air-barrier assemblies to comply with performance requirements indicated, as evidenced by reports based on mockup testing by a qualified testing agency.

1. Adhesion Testing: Mockups will be tested for required air-barrier adhesion to substrate in accordance with ASTM D4541.
2. Air-Leakage-Location Testing: Mockups will be tested for evidence of air leakage in accordance with ASTM E1186, Modified (Bubble-gun air leakage testing at anchor penetrations).
3. Air-Leakage-Volume Testing: Mockups will be tested for air-leakage rate in accordance with ASTM E783 as part if window and/or curtain wall assembly air testing .
4. Adhesion Testing: Mockups will be tested for required air-barrier adhesion to substrate in accordance with ASTM D4541.
5. Notify Commissioner and BECA seven days in advance of the dates and times when mockups will be tested.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

1.11 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction to be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested in accordance with ASTM E2357, as provided in submittal of manufacturing testing data for identical application.

2.3 NONBITUMINOUS SHEET AIR BARRIER

A. Vapor-Permeable Nonbituminous Sheet: Minimum 20-mil- thick, self-adhering sheet consisting of a breathable carrier film or fabric and an adhesive with release liner on adhesive side and formulated for application with primer that complies with VOC limits.

1. Basis-of-Design Product: Subject to compliance with requirements, provide SOPREMA; SOPRASEAL STICK VP or comparable product by one of the following:

   a. GCP Applied Technologies Inc.
   b. Henry Company.
   c. VaproShield LLC.
   d. Or approved equal .

2. Physical and Performance Properties:

   a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E2178.
   b. Puncture Resistance: Minimum 40 lbf; ASTM E154/E154M.
   c. Vapor Permeance: Minimum 15 perms; ASTM E96/E96M, Desiccant Method, Procedure A.h
   d. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested in accordance with ASTM D4541 as modified by ABAA.
   e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
   f. Nail Sealability, ASTM D1970: Pass

2.4 ACCESSORY MATERIALS

A. Requirement: Provide primers, transition strips, termination strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

B. Stainless Steel Sheet: ASTM A240/A240M, Type 304, thick, and Series 300 stainless steel fasteners.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
3. Verify that substrates are visibly dry and free of moisture. Test concrete substrates for capillary moisture by plastic sheet method in accordance with ASTM D4263.
4. Verify that masonry joints are flush and completely filled with mortar.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 SURFACE PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate in accordance with manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

H. Bridge isolation joints expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement in accordance with manufacturer's written instructions and details.

3.4 INSTALLATION OF NONBITUMINOUS SHEET AIR BARRIER

A. Install materials in accordance with air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.

1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
2. Follow all manufacturer requirements for minimum membrane overlap distances.
3. Verify compatibility between air barrier and any other membranes, sealants, mastics, or accessory materials prior to installation. Only use sealants, mastics and accessory materials approved by manufacturer for use with air barrier product.

B. Prepare, treat, and seal inside and outside corners and vertical and horizontal surfaces at terminations and penetrations with termination mastic.

C. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier sheet on same day. Reprime areas exposed for more than 24 hours.

D. Apply and firmly adhere air-barrier sheets over area to receive air barrier. Accurately align sheets and maintain uniform lap widths and end laps per manufacturer's requirements but no less than 2 1/2". Overlap and seal seams, and stagger end laps to ensure airtight installation.

1. Apply sheets in a shingled manner to shed water.
2. Roll sheets firmly to enhance adhesion to substrate.

E. Apply continuous air-barrier sheets over accessory strips bridging substrate cracks, construction, and contraction joints.

F. CMU: Install air-barrier sheet horizontally against the CMU beginning at base of wall. Align top edge of air-barrier sheet immediately below protruding masonry ties or joint reinforcement or ties, and firmly adhere in place.

1. Overlap horizontally adjacent sheets per manufacturer's requirements but no less than 2 1/2" and roll seams.
2. Apply overlapping sheets with bottom edge slit to fit around masonry reinforcing or ties. Roll firmly into place.
3. Seal around masonry reinforcing or ties and penetrations with manufacturer approved termination mastic.
4. Continue the sheet into all openings in the wall, such as doors and windows, and terminate at points to maintain an airtight barrier that is not visible from interior.

G. Seal top of through-wall flashings to air-barrier sheet with an additional transition strip at width required by manufacturer but no less than 6"wide .

H. Seal exposed edges of sheet at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with manufacturer approved termination mastic.

I. Install air-barrier sheet and accessory materials to form a seal with adjacent construction and to maintain a continuous air barrier.

1. Coordinate air-barrier installation with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install transition strip on roofing membrane or base flashing so that a minimum coverage distance required by manufacturer but no less than 4 inches of coverage is achieved over each substrate.
3. Verify compatibility between air barrier, roof membranes, and any accessory material prior to overlapping materials.

J. Connect and seal exterior wall air-barrier sheet continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using manufacturer approved accessory materials.

K. At end of each working day, seal top edge of air-barrier material to substrate with termination mastic.

L. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

M. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum coverage distance as required by manufacturer but no less than 3 inches of coverage is achieved over each substrate. Maintain minimum contact distance required by manufacturer but no less than 3 inches of contact over firm bearing to perimeter frames, with full contact distance required by manufacturer but no less than 1 inch of full contact.

1. Transition Strip: Roll firmly to enhance adhesion.
2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.

N. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of air-barrier material with manufacturer approved foam sealant.

O. Repair punctures, voids, and deficient lapped seams in air barrier. Slit and flatten fishmouths and blisters. Patch with air-barrier sheet extending distance required by manufacturer but no less than 6 inches beyond repaired areas in all directions.

P. Do not cover air barrier until it has been tested and inspected by testing agency.

Q. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Continuous structural support of air-barrier system has been provided.

3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
4. Site conditions for application temperature and dryness of substrates have been maintained.
5. Maximum exposure time of materials to UV deterioration has not been exceeded.
6. Surfaces have been primed.
7. Laps in sheet materials have complied with the minimum requirements and have been shingled in the correct direction (or mastic applied on exposed edges), with no fishmouths.
8. Termination mastic has been applied on cut edges.
9. Air barrier has been firmly adhered to substrate.
10. Compatible materials have been used.
11. Transitions at changes in direction and structural support at gaps have been provided.
12. Connections between assemblies (air barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

C. Field Tests: (Subsequent to passing of Mock-up testing) :

1. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate in accordance with ASTM D4541 for each 600 sq. ft. of installed air barrier or part thereof.
2. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage in accordance with ASTM E1186, Modified (Bubble-gun air leakage testing at anchor penetrations).
3. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate in accordance with ASTM E783 as part of window and/ or curtain wall assembly air testing.
4. Refer to BECx & FPT Specification Section 019119.43 for number of field tests. AOR to select locations.

D. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, in accordance with manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

F. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, in accordance with manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials in accordance with air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed Work, using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 072715

SECTION 074213.13 - FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Concealed-fastener, lap-seam metal wall panels.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Commissioner, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
6. Review requirements for certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal panel assembly during and after installation.
8. Review of procedures for repair of metal panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

1. Exposed-fastener, lap-seam metal wall panels.
2. Concealed-fastener, lap-seam metal wall panels.
3. Metal liner panels.

B. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
2. Health Product Declaration: For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

D. Samples for Initial Selection: For each type of metal panel indicated with factory-applied finishes.

1. Include Samples of trim and accessories involving color selection.

E. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:

1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For concealed-fastener, lap-seam metal wall panels, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.9 MOCKUPS

A. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of each typical metal panel assembly as required by Commissioner, including corner, supports, attachments, and accessories. Minimum size of 8' long by 4' tall.
2. Water-Spray Test: Conduct water-spray test of metal panel assembly mockup, testing for water penetration according to AAMA 501.2.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.11 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.12 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.13 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

C. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft..

D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 2.86 lbf/sq. ft..

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

F. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

A. Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Reveal-Joint, Concealed-Fastener Metal Wall Panels MT-02: Formed with vertical panel edges and between panel edges; with narrow reveal joint between panels.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Morin Corp; Pulse P-1 or comparable product by one of the following:

a. Metal Sales & Service, Inc.
b. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.
c. Or approved equal.

2. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

a. Thickness: 0.040 inch.
b. Perforations: perforated to allow 40% open area
c. Surface: Smooth, flat finish.
d. Exterior Finish: Two-coat fluoropolymer.
e. Color: As selected by Commissioner from manufacturer's full range.

3. Panel Coverage: 12 inches.
4. Panel Height: 1.5 inches.

2.3 METAL PLATE WALL PANELS

A. Metal Plate Wall Panels MT-01: Provide factory-formed, metal plate wall panels fabricated from single sheets of metal formed into profile for installation method indicated. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Alfrex; Alfrex Plate or comparable product by one of the following:

a. American Metalcraft Inc.
b. Castle Metal Products.
c. Alucobond.
d. Or approved equal.

2. Aluminum Sheet: Tension-leveled, smooth aluminum sheet, ASTM B 209, 0.125 inch thick.
3. Exterior Finish: Two-coat fluoropolymer .

4. Color: As selected by Commissioner from manufacturer's full range.
5. Attachment Assembly: Rainscreen-principle system

2.4 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

C. Panel Fasteners: Stainless Steel Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

2.5 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

   a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.6 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:

   1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

   1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
   2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

      a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.4 INSTALLATION OF METAL PANELS

A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
3. Copper Panels: Use copper, stainless steel, or hardware-bronze fasteners.
4. Stainless Steel Panels: Use stainless steel fasteners.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
5. Flash and seal panels with weather closures at perimeter of all openings.

E. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.13

SECTION 074293 - SOFFIT PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Metal soffit panels.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Metal soffit panels.

B. Product Data Submittals:

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

C. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

D. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, tests performed by a qualified testing agency.

C. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

C. Mockups: Build mockups as required by Commissioner to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical soffit ; approximately two panels wide by full eave width, including attachments and accessories.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.11 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

3. Deflection Limits: For wind loads, no greater than 1/240 of the span.

C. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METAL SOFFIT PANELS

A. Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Reveal-Joint-Profile Metal Soffit Panels SOF-01: Solid panels formed with vertical panel edges and a flat pan between panel edges; with recessed reveal joint between panels.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Atlas International; OMAWALL PL WITH EVO or comparable product by one of the following:

   a. Drexel Metals.
   b. Firestone Metal Products, LLC.
   c. PAC-CLAD; Petersen Aluminum Corporation.
   d. Or approved equal.

2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

   a. Nominal Thickness: 0.040 inch min.
   b. Exterior Finish: Three-coat fluoropolymer.
   c. Color: As selected by Commissioner from manufacturer's full range.

3. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

   a. Thickness: 0.040 inch min.
   b. Surface: Smooth, flat finish.
   c. Exterior Finish: Three-coat fluoropolymer.

d. Color: As selected by Commissioner from manufacturer's full range.

4. Panel Height: 1.5 inches.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

C. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

D. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

E. Lighting integration: Cutouts, clips, and wire management accessories to accept recessed lighting and housing as required.

2.4 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

D. Aluminum Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.
2. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.

a. Verify that air- or water-resistive barriers been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

1. Soffit Framing: Fasten furring channels to supports, as required to comply with requirements for assemblies indicated.

3.4 INSTALLATION OF METAL SOFFIT PANELS

A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

2. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
3. Copper Panels: Use copper, stainless steel, or hardware-bronze fasteners.
4. Stainless Steel Panels: Use stainless steel fasteners.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

E. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074293

SECTION 075600 - COLD LIQUID APPLIED POLYMETHYL METHACRYLATE (PMMA) HYBRID MEMBRANE ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Cold liquid applied PMMA hybrid membrane roofing system. (RF-01)
2. Styrene butadiene-styrene (SBS) Base sheet.
3. Cold Liquid Applied PMMA roofing membrane.
4. Accessory roofing system materials.
5. Roof Insulation
6. Insulation Accessories
7. Cover Board
8. Coating System/Products
9. Electronic leak-detection (ELD) materials.

B. Related Requirements:

1. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
2. Section 077100 "Roof Specialties" for premanufactured metal copings roof edge flashings counterflashings.
3. Section 072100 - Thermal Insulation
4. Section 072715 - Nonbituminous Self-adhering Sheet Air Barriers
5. Section 077200 - Roof Accessories

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "Roofing Manual: Membrane Roof Systems" apply to Work of this Section.

1.4 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.

1. Meet with Commissioner, testing and inspecting agency representative, Roofing System Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and other installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing system installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

B. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Commissioner, testing and inspecting agency representative, Roofing System Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and other installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing system installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Test Reports: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirements.

2. Health Product Declaration (HPD): Provide documentation confirming product compliance with one of the following:

    a. Inventory or HPD to at least 0.01 percent by weight, with at least 95 percent assessed using GreenScreen Benchmark assessment.
    b. Cradle to Cradle v3 certification with minimum Silver level of Material Health.
    c. Living Product Challenge certification indicating achievement of Imperative 09, "Transparent Material Health."

C. Shop Drawings: Include plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane terminations.
3. Flashing details at penetrations.
4. Tapered insulation, including slopes.
5. Roof plan showing orientation of roof deck and orientation of roofing membrane, and fastener spacings and pattern for corner, perimeter, and field-of-roof locations.
6. Crickets, saddles, and tapered edge strips, including slopes.
7. Tie-in with adjoining wall system air barrier.

D. Samples for Verification: For the following products:

1. Cap Sheet: Samples of manufacturer's standard colors for selection by Commissioner.
2. Base Flashing Sheet: Samples of manufacturer's standard colors for selection by Commissioner.
3. Walkways: Samples of manufacturer's standard colors for selection by Commissioner.

E. Wind-Uplift Resistance Submittal: For roofing system indicating compliance with wind uplift performance requirements.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For roofing system Installer manufacturer and testing agency.

B. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roofing membrane manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

    a. Submit evidence of complying with performance requirements.

2. Special Warranty Certificate: Signed by roofing membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

C. Product Test Reports: For roofing membrane and insulation, tests performed by a qualified testing agency, indicating compliance with specified requirements.

D. Evaluation Reports: For components of membrane roofing system, for tests performed by a qualified testing agency.

E. Field Test Reports:

1. Concrete internal relative humidity test reports.
2. Fastener pullout test results and manufacturer's revised requirements for fastener patterns.

F. Field quality-control reports.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Manufacturer Qualifications: A qualified manufacturer that is UL listed listed in FM Approvals' RoofNav for roofing system identical to that used for this Project.

C. Installer Qualifications: An entity meeting the requirements in DDC General Conditions Section 014000 1.7/C/3.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.

1. Protect stored liquid material from direct sunlight.
2. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources.

1. Store in a dry location.
2. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.11 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed in accordance with manufacturer's written installation instructions and warranty requirements.

1.12 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty to include all components of roofing system, such as substrate board, vapor retarder, roof insulation, fasteners, adhesives, cover board, roofing membranes, base flashing sheet, walkway products, and other components of roofing system.
2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain components for roofing system from roofing membrane manufacturer or manufacturer approved by roofing membrane manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing system and flashings to withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing system and flashings to remain watertight.

1. Accelerated Weathering: Roofing membrane to withstand 2000 hours of exposure when tested in accordance with ASTM G152, ASTM G154, or ASTM G155.
2. Impact Resistance: Roofing membrane to resist impact damage when tested in accordance with ASTM D3746/D3746M, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" section in FM Approvals 4470.

B. Material Compatibility: Roofing system materials to be compatible with one another and adjacent materials under conditions of service and installation required, as demonstrated by roofing membrane manufacturer based on testing and field experience.

C. Wind-Uplift Resistance: Design roofing system to resist the following wind-uplift pressures when tested in accordance with FM Approvals 4474, UL 580, or UL 1897:

1. Wind Uplift Load Capacity: 90 psf.

D. FM Approvals' RoofNav Listing: Roofing membrane, base flashings, and component materials comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and are listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.

1. Fire/Windstorm Classification: Class 1A-90.
2. Hail-Resistance Rating: FM 1-34 MH.

E. SPRI's "Directory of Roof Assemblies" Listing: Roofing membrane, base flashings, and component materials comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system and are listed in SPRI's "Directory of Roof Assemblies" for roof assembly identical to that specified for this Project.

1. Wind-Uplift Load Capacity: 90 psf.

F. Solar Reflectance Index (SRI): Three-year-aged SRI not less than 64 or initial SRI not less than 82 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

G. Solar Reflectance Index (SRI): Three-year-aged SRI not less than [64] [15] when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

H. Cool Roof Rating Council (CRRC): Roofing system to be listed by the CRRC for low-slope roof products.

I. Energy Performance: Roofing system to have an initial solar reflectance index (SRI) of not less than 0.70 and an emissivity of not less than 0.75 when tested in accordance with CRRC S100.

J. Exterior Fire-Test Exposure: Class A; for installation and roof slopes indicated; when tested by a qualified testing agency in accordance with ASTM E108 or UL 790.

1. Identify products with appropriate markings of applicable testing agency.

K. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated.

1. Identify products with appropriate markings of applicable testing agency.

2.3 COLD LIQUID APPLIED PMMA HYBRID ROOFING MEMBRANE SYSTEM (RF-01)

A. Roofing System Components: See the following articles for individual roof materials required.

1. Basis-of-Design Product: Subject to compliance with requirements, provide SIPLAST; Parapro PMMA/SBS Hybrid Membrane System or comparable product by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Polyglass U.S.A., Inc.
c. Sika USA
d. Soprema, Inc.
e. Or approved equal.

2.4 BASE SHEET

A. SBS-Modified Bitumen Polyester-Mat Base Sheet: ASTM D6164/D6164M, Type I, Grade S, reinforced with polyester fabric, smooth surfaced, suitable for installation method specified.

1. Basis-of-Design Product: Subject to compliance with requirements, provide SIPLAST; Pro Base SA or comparable product by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Polyglass U.S.A., Inc.
c. Sika USA
d. Soprema, Inc.
e. Or approved equal.

2.5 ACCESSORY ROOFING SYSTEM MATERIALS

A. General: Accessory materials as recommended in writing by roofing membrane manufacturer for intended use, compatible with other roofing components, and suitable for installation method specified.

1. Adhesives and Sealants: Comply with VOC limits of the State of New York and New York City building code.
2. Adhesives and sealants must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
3. Adhesives and sealants shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Primer:

1. Rapid curing, polymethyl methacrylate (PMMA) liquid resin used to promote adhesion of PMMA/PMA membranes over wood, concrete and approved waterproofing board substrates.

C. Reinforcing Fabric:

1. Woven polyester reinforcement used in PMMA/PMA liquid applied membrane and flashing applications.

D. Miscellaneous Accessories: As recommended in writing by roofing membrane manufacturer.

2.6 VAPOR RETARDER

A. Laminated Sheet Vapor Retarder: Vapor retarding Air and Water Barrier approved for use on CLT deck.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Johns Manville; a Berkshire Hathaway company.
   b. Soprema
   c. Sika USA
   d. Or approved equal.

2. Permeance Rating: Consult CLT Manufacturer for minimum perm rating recommended for CLT roof deck. Unless otherwise indicated use Semi-permeable membrane (1-10 perm rating)
3. Flame Spread Index: Not more than 5 when tested in accordance with ASTM E84.
4. Smoke-Developed Index: Not more than 35 when tested in accordance with ASTM E84.
5. Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.7 ROOF INSULATION

A. General: Preformed roof insulation boards, manufactured or approved by roofing membrane manufacturer, approved for use in FM Approvals' RoofNav listed roof assemblies.

B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 3, felt or glass-fiber-mat facer on both major surfaces.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Siplast; Paratherm G or comparable product by one of the following:

a. Atlas Polyiso Roof and Wall Insulation.
b. Hunter Panels; a Carlisle company.
c. Johns Manville; a Berkshire Hathaway company.
d. Rmax, Inc.
e. Soprema Inc.
f. Or approved equal.

2. Compressive Strength: 25 psi.
3. Thickness:

a. Base Layer: 2 inches.
b. Upper Layer: 7 inches.

2.8 INSULATION ACCESSORIES

A. General: Roof insulation accessories as recommended in writing by roof membrane manufacturer for intended use, compatible with other roofing system components and suitable for installation method specified.

B. Thermally Broken Tube Washer: Plastic composite tube washer allowing thermally broken fastening of roof accessories through insulation. Load capacity meeting uplift and pullover requirements of project and specific use.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Fixfast; SureFast Tube Washer or comparable product by one of the following:

a. Ejot
b. FASTEC
c. or approved equal.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate and to another insulation layer

1. Adhesives and sealants must comply with the following limits for VOC content:

a. Plastic Foam Adhesives: 50 g/L.
b. Gypsum Board and Panel Adhesives: 50 g/L.

c. Multipurpose Construction Adhesives: 70 g/L.
d. Fiberglass Adhesives: 80 g/L.
e. Contact Adhesives: 80 g/L.
f. PVC Welding Compounds: 510 g/L.
g. Other Adhesives: 250 g/L.
h. Single-Ply Roof Membrane Sealants: 450 g/L.
i. Nonmembrane Roof Sealants: 300 g/L.
j. Sealant Primers for Nonporous Substrates: 250 g/L.
k. Sealant Primers for Porous Substrates: 775 g/L.

2. Adhesives and sealants must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
3. Adhesives and sealants shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.9 COVER BOARD

A. General: Cover board as recommended in writing by roof membrane manufacturer for intended use; compatible with other roofing system components and suitable for installation method specified.

B. Glass-Mat Gypsum Cover Board: ASTM C1177/C1177M, water-resistant gypsum board.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed; SAINT-GOBAIN.
b. Georgia-Pacific Gypsum LLC.
c. Gold Bond Building Products, LLC provided by National Gypsum Company.
d. USG Corporation.
e. Or approved equal.

2. Thickness: 1/4 inch .

2.10 COATING SYSTEM/PRODUCTS

A. A 100% solids, peroxide cured, elastomeric coating system composed of PMMA and other polymers designed for application over qualified and prepared roof systems. The cured coating system must be in conformance with the following:

1. Basis-of-Design Product: Subject to compliance with requirements, provide; SIPLAST, Paracoat HS. or comparable product by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Soprema
c. Polyglass USA Inc.
d. Sika USA
e. Or approved equal.

2. Physical Properties:

a. Thickness (dry film avg. when applied at 1 kg/m²): 30 mils (ASTM D5147)
b. Peak Load (min.) @ 73F (23C): 600 psi (ASTM D412)
c. Ultimate Elongation (min.) @ 73F (23C): 250% (ASTM D412)
d. Water Swelling (max.): 3% (ASTM D6083)

2.11 ELECTRONIC LEAK-DETECTION (ELD) MATERIALS

A. Conductive Medium: Materials providing less than 104 ohms per square as determined in accordance with ASTM D4496 and approved by roofing membrane manufacturer.

1. Electrically Conductive Primer: Water-based, nonflammable, nonmetallic, low-VOC primer, UL listed and FM Global approved.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1) Carlisle
2) Johns Mansville, a Berkshire Hathaway company.
3) GAF.
4) Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Roofing System Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane relative to adjoining deck.
4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
5. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer, when tested in accordance with ASTM F2170.

a. Test Frequency: One test probe per each 1000 sq. ft., or portion thereof, of roof deck, with not less than three test probes.
b. Submit test reports within 24 hours of performing tests.

6. Verify that concrete-curing compounds that impair adhesion of roofing components to roof deck have been removed.
7. Verify that joints in concrete roof decks have been grouted flush with top of concrete.
8. Verify that minimum curing period recommended by roofing system manufacturer for lightweight insulating concrete roof decks has passed.
9. Verify that any damaged sections of cementitious wood-fiber decks have been repaired or replaced.
10. Verify that adjacent cementitious wood-fiber panels are vertically aligned to within 1/8 inch at top surface.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation in accordance with roofing system manufacturer's written instructions.

1. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction.

1. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Prime surface of concrete roof deck with asphalt primer in accordance with roofing system manufacturer's written installation instructions and allow primer to dry.

D. Perform fastener-pullout tests in accordance with roofing system manufacturer's recommendations.

1. Submit test result within 24 hours of performing tests.

a. Include roofing system manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

E. Install sound-absorbing insulation strips in ribs of acoustical steel roof decks in accordance with acoustical roof deck manufacturer's written installation instructions.

3.4 INSTALLATION OF ROOFING, GENERAL

A. Install roofing system materials and components in accordance with roofing system manufacturer's written installation instructions, FM Approvals' RoofNav listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.

B. Complete terminations and base flashings. Provide temporary seals to prevent water from entering completed sections of roofing system at the end of workday or when rain is forecast.

1. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Coordinate installation and transition of roofing system component serving as an air barrier with wall system air barrier specified in Section 072715 "Nonbituminous Self-Adhering Sheet Air Barriers."

D. Asphalt Heating: Heat and apply hot asphalt in accordance with roofing system manufacturer's written installation instructions.

1. Heat asphalt to its equiviscous temperature, measured at the mop cart or mechanical spreader immediately before installation.
2. Circulate asphalt during heating.
3. Do not raise asphalt temperature above equiviscous temperature range more than one hour before time of installation.
4. Do not exceed asphalt manufacturer's recommended temperature limits during asphalt heating.
5. Do not heat asphalt within 25 deg F of flash point.
6. Discard asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.
7. Apply hot asphalt within plus or minus 25 deg F of equiviscous temperature.

E. SEBS-Modified Asphalt Heating: Heat and apply hot asphalt in accordance with roofing system manufacturer's written installation instructions.

F. Substrate-Joint Penetrations: Prevent hot-applied asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.5 INSTALLATION OF VAPOR RETARDER

A. Loosely lay vapor retarder sheet in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2 and 6 inches, respectively.

1. Extend vertically up parapet walls and projections to a minimum height equal to height of the insulation and cover board.
2. Continuously seal side and end laps.

B. Prime substrate, if required by manufacturer. Install sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 and 6 inches, respectively.

1. Extend vertically up parapet walls and projections to a minimum height equal to height of the insulation and cover board.
2. Seal laps by rolling.

C. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.6 INSTALLATION OF INSULATION

A. Coordinate installation of roofing system components, so insulation is not exposed to precipitation or left exposed at end of workday.

B. Comply with roofing system and insulation manufacturer's written installation instructions. Install minimum of two layers of insulation under area of roofing to achieve required thickness.

C. Install each layer of insulation with joints staggered not less than 24 inches in adjacent rowsand offset not less than 12 inches from previous layer.

1. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. Make joints between adjacent insulation boards not more than 1/4 inch in width.
3. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.
4. Trim insulation, so that water flow is unrestricted.
5. Fill gaps exceeding 1/4 inch with insulation.
6. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
7. Secure insulation in accordance with FM Approvals' RoofNav for specified Windstorm Resistance Classification.
8. Secure insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

D. Nailer Strips: Mechanically fasten 4-inch nominal- width, wood nailer strips of same thickness as insulation perpendicular to sloped roof deck at the following spacing:

1. 16 ft. apart for roof slopes greater than 1 inch per 12 inches but less than 3 inches per 12 inches.
2. 48 inches apart for roof slopes greater than 3 inches per 12 inches.

E. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing system with vertical surfaces or angle changes greater than 45 degrees.

3.7 INSTALLATION OF COVER BOARD

A. Comply with roofing system and insulation manufacturer's written installation instructions.

B. Install cover board over insulation with long joints in continuous straight lines, with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. At internal roof drains, conform to slope of drain sump.
3. Trim cover board, so that water flow is unrestricted.
4. Cut and fit cover board tight to nailers, projections, and penetrations.
5. Secure cover board to insulation in accordance with FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29.
6. Secure cover board to resist specified uplift pressure at corners, perimeter, and field of roof.

C. Install sheathing paper over cover board and immediately beneath roofing membrane.

3.8 INSTALLATION OF ELD COMPONENTS

A. Install conductive medium over insulation and on vertical locations to receive roofing membrane in accordance with manufacturer's written installation instructions.

3.9 INSTALLATION OF ROOFING MEMBRANE, GENERAL

A. Install roofing system in accordance with roofing system manufacturer's written installation instructions and applicable recommendations in NRCA's "Quality-Control Guidelines for the Application of Polymer-Modified Bitumen Roofing."

B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

C. Where roof slope exceeds 1/2 inch per 12 inches, install roofing membrane sheets parallel with slope.

1. Backnail roofing sheets to substrate in accordance with roofing system manufacturer's written installation instructions.

D. Coordinate installation of roofing system so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at end of workday or when rain is forecast.

1. Provide tie-offs at end of each day's work to cover exposed roofing sheets and insulation with a course of coated felt set in adhesive, with joints and edges sealed.
2. Complete terminations and base flashings, and provide temporary seals to prevent water from entering completed sections of roofing system.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

3.10 INSTALLATION OF BASE SHEET

A. Prime surface of substrate with primer in accordance with roofing membrane manufacturer's written installation instructions and allow primer to dry.

B. Before installing, unroll base sheet, cut into workable lengths, and allow to lie flat for a time period recommended by roofing membrane manufacturer for the ambient temperature at which base sheet will be installed.

C. Loosely lay one course of sheathing paper, lapping edges, and ends a minimum of 2 inches and 6 inches, respectively.

D. Installation of Base Sheet:

1. Install base sheet in accordance with roofing membrane manufacturer's written installation instructions, starting at low point of roof.
2. Extend base sheet over and terminate above cants.
3. Install base sheet in a shingle fashion.
4. Adhere base sheet to substrate in a uniform coating of cold-applied adhesive.
5. Self-adhere base sheet to substrate.

6. Mechanically fasten base sheet to substrate using fasteners specifically designed and sized for wood panel decks.

    a. Fasten base sheet to resist specified uplift pressure at corners, perimeter, and field of roof.

7. Install base sheet without wrinkles or rears, and free from air pockets.
8. Laps: Accurately align base sheet, without stretching, and maintain uniform side and end laps.

    a. Lap side laps as recommended by roofing membrane manufacturer but not less than 3 inches.
    b. Lap end laps as recommended by roofing membrane manufacturer but not less than 12 inches. Stagger end laps not less than 18 inches.
    c. Completely bond and seal laps, leaving no voids.
    d. Roll laps with a 20 lb roller.

9. Repair tears and voids in laps and lapped seams not completely sealed.
10. Apply pressure to body of base sheet in accordance with roofing membrane manufacturer's written installation instructions, to remove air pockets and to result in complete adhesion of base sheet to substrate.

E. Installation of Vented Base Sheet:

1. Mechanically fasten, using fasteners specifically designed and sized for applicable substrate vented base sheet with vented side down.

    a. Fasten vented base sheet in accordance with FM Approval's RoofNav for specified Windstorm Resistance Classification.
    b. Fasten vented base sheet to resist uplift pressure at corners, perimeter, and field of roof.

3.11 MIXING OF RESIN PRODUCTS

A. Preparation/Mixing/Catalyzing Resin Products: Pour the desired quantity of resin into a clean container and using a spiral mixer or mixing paddle, stir the liquid for the time period specified by the resin manufacturer. Calculate the amount of catalyst powder or liquid needed using the manufacturer's guidelines and add the pre-measured catalyst to the resin component. Mix again for the time period specified by the resin manufacturer, ensuring that the product is free from swirls and bubbles. To avoid aeration, do not use a spiral mixer unless the spiral section of the mixer can be fully contained in the liquid during the mixing process. Mix only enough product to ensure that it can be applied before pot life expires.

B. Preparation/Mixing/Catalyzing Aggregate-Filled Resin Products: Pour the entire desired quantity of resin into a clean container and slowly add the pre-measured quantity of aggregate using a spiral mixer or mixing paddle, stirring the mixture for the time period specified by the resin manufacturer. Calculate the amount of catalyst powder or liquid needed using the manufacturer's guidelines and add the pre-measured catalyst to the resin/aggregate mixture. Mix again for the time period specified by the resin manufacturer, ensuring that the product is free from swirls and bubbles. To avoid aeration, do not use a spiral mixer unless the spiral section of the mixer can be fully contained in the liquid during the mixing process. Mix only enough product to ensure that it can be applied before pot life expires.

3.12 PREPARATION PASTE AND PRIMER APPLICATION

A. Primer Application: Apply catalyzed primer resin using a roller or brush at the rate specified by the primer manufacturer over qualified and prepared substrates. Apply primer resin at the increased rate specified by the primer manufacturer over DensDeck Prime or other porous substrates. Do not let resin pool or pond. Do not under-apply or over-apply primers as this may interfere with proper primer catalyzation. Make allowances for waste, including saturation of roller covers and application equipment.

B. Paste Application: Apply catalyzed preparation paste using a trowel over prepared and primed substrates. Before application of any resin product over cured paste, wipe the surface of the paste using the specified cleaner/solvent and allow to dry. Treat the surface again if not followed up by resin application within 60 minutes.

3.13 FLASHING AND FIELD MEMBRANE APPLICATION

A. Base Flashing Application

1. Using masking tape, mask the perimeter of the area to receive the flashing system. Apply resin primer to substrates requiring additional preparation and allow primer to cure.
2. Pre-cut fleece to ensure a proper fit at transitions and corners prior to membrane application.
3. Apply an even, generous base coat of flashing resin to prepared surfaces using a roller at the rate specified by the resin manufacturer. Work the fleece into the wet, catalyzed resin using a brush or roller to fully embed the fleece in the resin and remove trapped air. Lap fleece layers a minimum of 2 inch (5 cm) and apply an additional coat of catalyzed resin between layers of overlapping fleece. Again using a roller, apply an even top coat of catalyzed resin immediately following embedment of the fleece at the rate specified by the resin manufacturer, ensuring that the fleece is fully saturated. Ensure that the flashing resin is applied to extend beyond the fleece (maximum ¼-inch (6 mm). Remove the tape before the catalyzed resin cures. Make allowances for waste, including saturation of roller covers and application equipment.
4. Should work be interrupted for more than 12 hours or the surface of the cured resin becomes dirty or contaminated by the elements, wipe the surface to be lapped with new flashing resin using the specified cleaner/solvent. Allow the surface to dry for a minimum 20 minutes and a maximum 60 minutes before continuing work.

B. Field Membrane Application

1. Using the specified cleaner/solvent, wipe flashing membrane surfaces to be lapped with field membrane. Allow the surface to dry for a minimum 20 minutes before continuing work.
2. Apply an even, generous base coat of field membrane resin to prepared surfaces using a roller at the rate specified by the resin manufacturer. Work the fleece into the wet, catalyzed resin using a 9-inch roller to fully embed the fleece in the resin and remove trapped air. Lap fleece layers a minimum of 2 inch (5 cm) and apply an additional coat of catalyzed resin between layers of overlapping fleece. Again using a roller, apply an even top coat of catalyzed resin immediately following embedment of the fleece at the rate specified by the resin manufacturer, ensuring that the fleece is fully saturated. Make allowances for waste, including saturation of roller covers and application equipment. Allow 2 hours cure time prior to exposing the membrane to foot traffic.

3.14 INSTALLATION OF BASE FLASHING AND STRIPPING

A. Install base flashing sheet over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates in accordance with roofing system manufacturer's written installation instructions and as follows:

1. Prime substrates with asphalt primer if required by roofing system manufacturer.
2. Backer Sheet Installation: Adhere backer sheet to substrate in a uniform layer of cold-applied adhesive.
3. Base Flashing Sheet Installation, Cold: Adhere base flashing sheet to substrate in cold-applied adhesive at rate required by roofing system manufacturer.

B. Extend base flashing sheet up walls or parapets to manufacturer's requirements but a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.

C. Mechanically fasten top of base flashing sheet securely at terminations and perimeter of roof.(if required by manufacturer)

1. Seal top termination of base flashing sheet.

D. Install liquid flashing system in accordance with roofing system manufacturer's written installation instructions.

1. Extend liquid flashing to manufacturer's requirements but not less than 3 inches in all directions from edges of item being flashed.
2. Embed granules, matching color of cap sheet, into wet compound.

E. Install cap sheet stripping where metal flanges and edgings are set on roof in accordance with roofing system manufacturer's written installation instructions.

F. Roof Drains: Set 30-by-30-inch- 4 lb flashing in bed of adhesive on completed roofing membrane.

1. Cover flashing with cap sheet stripping, and extend to manufacturer's requirements but a minimum of 6 inches beyond edge of metal flashing onto field of roofing membrane.
2. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
3. Install stripping in accordance with roofing system manufacturer's written installation instructions.
4. Install liquid flashing system in accordance with roofing system manufacturer's written installation instructions.

3.15 COATING SYSTEM APPLICATION

A. Continuously monitor and record ambient and substrate temperatures to ensure that the temperatures are acceptable for resin application. Maintain records.

B. If required for the specific substrate, apply catalyzed primer resin using a roller at the rate specified by the primer manufacturer for the specific substrates. Do not let the primer pool or pond. Do not under-apply or over-apply as this may interfere with proper primer catalyzation. Make allowances for waste, including saturation of roller covers.

C. Before application of coating over cured primer or previously applied coating, wipe the surface of the cured resin using the specified cleaner/solvent and allow to dry. Treat the surface again if not followed up by coating application within 60 minutes.

D. In areas subject to water/debris accumulation, apply an even, generous base coat of catalyzed coating resin to prepared surfaces using an approved 18-inch roller at the rate specified by the coating manufacturer. Work reinforcing fleece into the wet, catalyzed resin using a roller to fully embed the fleece in the resin and remove trapped air. Lap fleece layers a minimum of 2 inch (5 cm) and apply an additional coat of catalyzed resin between layers of overlapping fleece. Again using an approved 18-inch roller, apply an even top coat of catalyzed resin immediately following embedment of the fleece at the rate specified by the resin manufacturer, ensuring that the fleece is fully saturated.

E. In areas that are not subject to water/debris accumulation, apply an even, generous layer of catalyzed coating resin over the prepared roof surface using a crosshatch technique at the rate specified by the coating manufacturer.

F. In all cases, follow the coating application practices outlined below:

1. Cut-in perimeter areas, penetrations and edges in a uniform manner so as to provide an aesthetically pleasing appearance.
2. Make allowances for waste, including saturation of roller covers. Dispose of roller covers regularly to avoid curing of the resin saturating the cover.
3. Avoid heavy puddles of coating and ensure that the coating is never applied at less than the minimum rate to ensure proper catalyzation/cure.
4. Monitor pot life, and if insufficient to allow for full-batch application, maintain liquid resin at a lower storage temperature and work in smaller batches.
5. Monitor coverage and coating consumption based upon grid areas. Adjust grid size if consumption rates are insufficient to allow for full and even coverage.
6. Following cure, inspect the coating for thin spots and mask/prep/recoat as needed.

3.16 FIELD QUALITY CONTROL

A. BECA to inspect substrate conditions, surface preparation, roofing membrane installation, flashings, protection, and drainage components, and to furnish reports to Commissioner.

B. Perform the following tests:

1. ASTM D4541: Adhesion testing of fluid-applied waterproofing membrane.

   a. Tensile bond strength of membrane to substrate greater than or equal to 220 psi for pedestrian traffic and water flow/containment, as determined by use of an adhesion tester.
   b. 135° peel bond strength of membrane to substrate such that cohesive failure of substrate occurs before adhesive failure of membrane/substrate interface.
   c. In the event the bond strengths are less than the minimum specified, additional substrate preparation is required. Repeat testing to verify suitability of substrate preparation.
   d. Testing extent: 3 tests per every 5,000 sf; min. 3 tests at smaller areas.

2. High-Voltage Membrane Testing (ASTM D78877) : BECA observes and Testing agency surveys entire roof area, flashings, and parapet walls to locate discontinuity in the roofing membrane using an electrically charged metal "broom head."

    a. Perform tests according to ASTM D7877-14
    b. Perform tests before overlying construction is placed.
    c. After testing, repair areas of discontinuities, repeat tests, and make further repairs until roofing and flashing installations are contiguous.

        1) Cost of retesting is Contractor's responsibility.

    d. Testing agency to prepare survey report indicating locations of initial discontinuities, if any.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Commissioner, and to prepare inspection report.

1. Notify Commissioner 48 hours in advance of date and time of inspection.

D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

E. Roofing system will be considered defective if it does not pass tests and inspections.

1. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.17 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period.

1. When remaining construction does not affect or endanger roofing, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Commissioner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and in accordance with warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075600

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes: Custom flashing and trim fabrications, made from the following:

1. Sheet metal materials.

B. Related Requirements:

1. Section 042000 - Unit Masonry
2. Section 047200 - Cast Stone Masonry
3. Section 071326 - Self-Adhering Sheet Waterproofing
4. Section 072715 - Nonbituminous Self-Adhering Sheet Air Barriers
5. Section 074213.13 - Formed Metal Wall Panels
6. Section 075600 - Cold Liquid Applied Polymethyl Methacrylate (PMMA) Hybrid Membrane Roofing
7. Section 077100 "Roof Specialties" for manufactured copings, roof-edge specialties, roof-edge drainage systems, reglets, and counterflashings.
8. Section 079200 - Joint Sealants

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review requirements for certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For sheet metal flashing and trim.

1. Plans, elevations, sections, and attachment details.
2. Fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Identification of material, thickness, weight, and finish for each item and location in Project.
4. Details for forming, including profiles, shapes, seams, and dimensions.
5. Details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Details of termination points and assemblies.
7. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Details of roof-penetration flashing.
9. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Details of special conditions.
11. Details of connections to adjoining work.
12. Formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.

C. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.

D. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of exposed finish.

E. Samples for Verification: Actual sample of finished products for each type of exposed finish for sheet metal and other metal accessories.

1. Sheet Metal Flashing and Trim: Manufacturers' standard size. Include finished seam with required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.6 INFORMATIONAL SUBMITTALS

A. Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Research Reports: For copings and roof edge flashing, from an qualified testing agency showing compliance with ANSI/SPRI/FM 4435/ES-1.

D. Qualification Statements: For fabricator.

E. Sample warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the requirements in DDC General Conditions Section 014000 1.7/C/1.

C. Fabricator Qualifications: Entity that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

D. For roof edge flashings and copings that are ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved, shop is to be listed as able to fabricate required details as tested and approved.

1.9 MOCKUPS

A. Build mockups as required by Commissioner to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build integrated mockups of exterior wall assembly as diagrammed on A-350, incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations.

a. Coordinate construction of mockups to permit inspection and testing of sheet metal flashing before external cladding is installed.
b. If Commissioner determines mockups do not comply with requirements, reconstruct mockups and apply sheet metal flashing until mockups are approved.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
2. Protect stored sheet metal flashing and trim from contact with water.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.11 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, are to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim are not to rattle, leak, or loosen, and are to remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Design Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

D. SPRI Wind Design Standard: Manufacture and install roof edge flashings and copings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:

1. Design Pressure: As indicated on Drawings.

E. FM Approvals Listing: Manufacture and install roof edge flashings and copings that comply with requirements in FM Approvals 4471 as part of a roofing system and that are listed in FM Approvals' "Approval Guide" and approved for windstorm classification, Class 1A-90. Identify materials with name of fabricator and design approved by FM Approvals.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METAL MATERIALS

A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Stainless Steel Sheet: ASTM A240/A240M, Type 316, dead soft, fully annealed.

1. Nominal Thickness: 0.0188 inch.
2. Surface: Smooth, flat.
3. Exterior Finish: Per Drawings

2.3 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 ft. on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

G. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
2. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
3. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

H. Do not use graphite pencils to mark metal surfaces.

2.4 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12 ft. long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials:

1. Stainless Steel: 0.0156 inch thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:

1. Stainless Steel: 0.0156 inch thick.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrates, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF SHEET METAL FLASHING AND TRIM, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder.
3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
8. Do not field cut sheet metal flashing and trim by torch.
9. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

1. Space movement joints at maximum of 10 ft. with no joints within 24 inches of corner or intersection.
2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
3. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.

a. Embed hooked flanges of joint members not less than 1 inch into sealant.
b. Form joints to completely conceal sealant.

c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.

d. Adjust setting proportionately for installation at higher ambient temperatures.

1) Do not install sealant-type joints at temperatures below 40 deg F.

2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Rivets: Rivet joints in zinc where necessary for strength.

3.4 INSTALLATION OF WALL SHEET METAL FABRICATIONS

A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.5 INSTALLATION TOLERANCES

A. Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 ft. on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING

A. Clean and neutralize flux materials. Clean off excess solder.

B. Clean off excess sealants.

3.7 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.

C. Maintain sheet metal flashing and trim in clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Commissioner.

END OF SECTION 076200

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes: Manufactured units for the following applications:

1. Copings.

B. Related Requirements:

1. Section 042000 "Unit Masonry"
2. Section 072100 - Thermal Insulation
3. Section 072715 - Nonbituminous Self-Adhering Sheet Air Barriers
4. Section 074213.13 - Formed Metal Wall Panels
5. Section 075600 - Cold Liquid Applied Polymethyl Methacrylate (PMMA) Hybrid Membrane Roofing
6. Section 076200 "Sheet Metal Flashing and Trim" for custom- and site-fabricated, sheet metal flashing and trim.
7. Section 079200 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Commissioner, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer's representative, structural-support installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of roof specialty.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof specialties.

1. Plans, expansion-joint locations, keyed details, and attachments to other work. Distinguish between factory pre manufactured- and field-assembled installation.
2. Details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
4. Details of termination points and assemblies, including fixed points.
5. Details of special conditions.

C. Samples: For each type of roof specialty and for each color and texture specified.

D. Samples for Initial Selection: For each type of roof specialty indicated with factory-applied color finishes.

E. Samples for Verification:

1. Include Samples of each type of roof specialty to verify finish and color selection, in manufacturer's standard sizes.
2. Include copings made from 12-inch lengths of full-size components in specified material, and including fasteners, cover joints, accessories, and attachments.

F. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of roof specialty copings that is ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved.

B. Product Test Reports: For copings, for tests performed by a qualified testing agency.

C. Qualification Statements: For manufacturer.

D. Sample warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roof specialties.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the requirements in DDC General Conditions Section 014000 1.7/C/1.

C. Manufacturer Qualifications: A qualified manufacturer offering products that are FM Approvals listed for specified class and ANSI/SPRI/FM 4435/ES-1 tested to specified design pressure.

1.9 MOCKUPS

A. Build mockups as required by Commissioner to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build integrated mockups of exterior wall assembly as diagrammed on A-350, incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations.

a. If Commissioner determines mockups do not comply with requirements, reconstruct mockups and apply copings until mockups are approved.

2. Build mockup of typical roof edge, including fascia, approximately 10 ft. long, including supporting construction, seams, attachments, underlayment, and accessories.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.11 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.12 COORDINATION

A. Coordinate roof specialties with roofing system, exterior wall system, air barrier, flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, weathertight, secure, and noncorrosive installation.

1. Performance Coordination: Coordinate with the Work of roofing and exterior wall Sections to ensure that roof specialties provided under the Work of this Section meet or exceed specified roofing and exterior wall design performance requirements.

B. Confirm and coordinate compatibility of materials and comply with warranty requirements of roofing system manufacturer.

C. Coordinate roof specialties layout and seams with sizes and locations of joints and seams in adjacent materials.

1.13 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer agrees to repair finishes or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain roof specialties from single manufacturer providing roofing-system warranty specified in Section 075600 "Cold Liquid Applied Polymethyl Methacrylate (PMMA) Hybrid Membrane Roofing".

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties to withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Recycled Content: Provide manufacturer documentation for recycled content, indicating postconsumer and preconsumer recycled content.

C. FM Approvals' Listing: Manufacture and install copings that are listed in FM Approvals' "Approval Guide" and approved for windstorm classification, Class 1-90. Identify materials with FM Approvals' markings.

D. SPRI Wind Design Standard: Manufacture and install copings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressures:

1. Design Pressure: As indicated on Drawings.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.3 COPINGS

A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 ft., concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ATAS International, Inc.
   b. FlashCo Manufacturing Inc.
   c. Merchant & Evans Inc.
   d. Metal-Era, Inc.
   e. OMG Roofing Products; a Division of OMG, Inc.
   f. Or approved equal.

2. Coping-Cap Attachment Method: face leg hooked to continuous cleat with back leg fastener exposed, fabricated from coping-cap material.

   a. Face-Leg Cleats: Concealed, continuous galvanized-steel sheet.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF UNDERLAYMENT

A. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, in accordance with manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.

1. Lap horizontal joints not less than 4 inches.

B. Self-Adhering, High-Temperature Sheet Underlayment:

1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
2. Prime substrate if recommended by underlayment manufacturer.
3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
6. Roll laps and edges with roller.
7. Cover underlayment within 14 days.

C. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim.

1. Install in shingle fashion to shed water.
2. Lap joints not less than 2 inches.

D. Slip Sheet: Install slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

1. Install in shingle fashion to shed water.
2. Lapp joints not less than 4 inches.

3.4 INSTALLATION, GENERAL

A. Install roof specialties in accordance with manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer's written installation instructions.

1. Coat concealed side of uncoated aluminum and stainless steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 ft. with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended in writing by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by roof specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.5 INSTALLATION OF COPINGS

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.
2. Interlock face-leg drip edge into continuous cleat anchored to substrate at manufacturer's required spacing that meets performance requirements. Anchor back leg of coping with screw fasteners and elastomeric washers at manufacturer's required spacing that meets performance requirements.

3.6 CLEANING AND PROTECTION

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing in accordance with ASTM A780/A780M.

B. Touch up factory-primed surfaces with compatible primer ready for field painting.

C. Clean and neutralize flux materials. Clean off excess solder and sealants.

D. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

E. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures, as determined by Commissioner.

END OF SECTION 077100

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes: Manufactured units for the following applications:

1. Roof curbs.
2. Equipment supports.
3. Heat and smoke vents.
4. Pipe and duct supports.
5. Heavyweight Pavers
6. Miscellaneous materials.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

C. Samples: For each type of roof accessory and for each color and texture specified.

D. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof accessories in contact with other materials that might cause staining, denting, or other surface damage. Store roof accessories in accordance with manufacturer's instructions.

B. Store materials off ground in dry location and in accordance with manufacturer's instructions in well-ventilated area.

C. Store and protect roof accessories from nicks, scratches, and blemishes.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-accessory substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.7 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories to withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Wind-Restraint Performance: As indicated on Drawings.

2.2 ROOF CURBS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AES Sunoptics; Acuity Brands International, Inc.
2. ATAS International, Inc.
3. Louvers & Dampers, Inc.; Mestek, Inc.
4. Roof Products, Inc.
5. Or approved equal.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Supported Load Capacity: Coordinate load capacity with information on Shop Drawings of equipment to be supported.

2.3 EQUIPMENT SUPPORTS

A. Ballast free, non-penetrating, equipment attachments: Secure PV rooftop equipment at RF-02 with an engineered attachment system designed for maintaining a watertight condition without damage to the roofing assembly. The anchor assembly must consist of a flashing, weatherized steel plate, and a welded, threaded attachment meeting requirements for the specific application.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Anchor Products; U anchor 2200 or comparable product by one of the following:

1. Nicholson Roof Products
2. N vent
3. Or approved equal

C. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

D. Supported Load Capacity: Coordinate load capacity with information on Shop Drawings of equipment to be supported.

E. Provide rooftop anchors with the following:

1. Matching waterproofing type and brand
2. Documentation of acceptance of attachment solution by roofing manufacturer issuing project guarantee and warranty specifically stating that roofing warranty will apply to flashing over attachment solution.
3. Documentation of a direct path of attachment from decking through attached equipment
4. Engineering certification stating no potential path for potential water into or through the attachment assembly.
5. Seals, gaskets, sealant and other non-permanent, non-structural solutions are not acceptable.

2.4 HEAT AND SMOKE VENTS

A. Hatch-Type Heat and Smoke Vents: Manufacturer's standard, with single-walled insulated curbs, welded or mechanically fastened and sealed corner joints, integral condensation gutter, and cap flashing. Fabricate with insulated double-walled lid and continuous weathertight perimeter lid gaskets, and equip with automatic self-lifting mechanisms and UL-listed fusible links rated at 165 deg F smoke-detection system.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ACUDOR Products, Inc.
b. Babcock-Davis.
c. BILCO Company (The).
d. J. L. Industries, Inc.; Activar Construction Products Group, Inc.
e. Nystrom, Inc.
f. Or approved equal.

2. Type and Size:

   a. Single-leaf lid, size as indicated on Drawings.

3. Loads: Minimum 40 lbf/sq. ft. external live load and internal uplift load.

   a. When release is actuated, lid to open against 10 lbf/sq. ft. snow or wind load and lock in position.

4. Heat and Smoke Vent Standard: Provide units that have been tested and listed to comply with ANSI/CAN/UL 793.
5. Curb, Framing, and Lid Material, Steel: Zinc-coated (galvanized) steel sheet.

   a. Thickness: Manufacturer's standard thickness for hatch size indicated.
   b. Color: As selected by Commissioner from manufacturer's full range.

6. Construction:

   a. Insulation: 2-inch- thick, polyisocyanurate board.

      1) R-Value: 12.0 unless otherwise indicated, in accordance with ASTM C1363.
   b. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
   c. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
   d. Security Grille: Provide where indicated on Drawings.
7. Hardware: Manufacturer's standard stainless steel; with hinges, hold-open devices, and independent manual-release devices for inside operation of lids.

2.5 PIPE AND DUCT SUPPORTS

A. Duct Supports: Two hot-dip galvanized or stainless steel stanchion bases with anchorage points designed per project specifications, a braced strut assembly or hot-dip galvanized steel header, which his connected to the two stanchion bases, A hanger system or tie down system, which will provide positive restraint in both the vertical and lateral directions, while allowing for some longitudinal expansion and contraction of the system supported.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      a. Roof Products and Systems (RPS); Duravent Group.
      b. Thaler Metal Industries Ltd.
      c. Miro Industries Inc.
      d. Or approved equal.

   2. Finish: Manufacturer's standard.

2.6 HEAVYWEIGHT ROOF PAVERS

A. Heavyweight Roof Pavers: Heavyweight, hydraulically pressed concrete units, square edged, factory cast for use as roof pavers; absorption not greater than 5 percent in accordance with ASTM C140/C140M; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance in accordance with ASTM C67; and as follows:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hanover Architectural Products.
    b. Roofblok Limited.
    c. Sunny Brook Pressed Concrete Company.
    d. Wausau Tile Inc.
    e. Or approved equal.

2. Size: 24 by 24 inches, 2" Thick; manufactured to dimensional tolerances of plus or minus 1/16 inch in length, height, and thickness.
3. Weight: 22 lbs/sq. ft
4. Compressive Strength: 6500 psi, minimum.
5. Colors and Textures: As selected by Commissioner from manufacturer's full range.
6. Solar Reflectance Index (SRI): Three-year-aged SRI not less than 64 or initial SRI not less than 82 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
7. Paver Support Assembly: Paver manufacturer's standard SBR rubber, high-density polyethylene, or polyurethane paver support assembly, including adjustable or stackable pedestals, shims, and spacer tabs for joint spacing of 1/8 to 3/16 inch.

2.7 METAL MATERIALS

A. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheer complying with minimum ASTM A653/A653M, G90 coating designation or aluminum-zinc alloy-coated steel sheet complying with minimum ASTM A792/A792M, Class AZ50 coating designation; structural quality.

1. Powder Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils.
2. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.

2.8 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.

C. Security Grilles: diameter, ASTM A1011/A1011M steel bars spaced o.c. in one direction and o.c. in the other; factory finished as follows:

1. Surface Preparation: Remove mill scale and rust, if any, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
2. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment.
3. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer; selected for resistance to normal atmospheric corrosion, for compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats under prolonged exposure.

D. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

E. Elastomeric Sealant: ASTM C920, elastomeric polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

G. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

2.9 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA AMP 500, "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Install roof accessories in accordance with manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended in writing by manufacturer's written installation instructions.

1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

3.4 INSTALLATION OF ROOF ACCESSORIES

A. Roof Curb: Install each roof curb so top surface is level.

B. Equipment Support: Install equipment supports so top surfaces are level with each other.

C. Heat and Smoke Vent:

1. Install heat and smoke vent so top perimeter surfaces are level.
2. Install and test heat and smoke vents and their components for proper operation in accordance with NFPA 204.

D. Pipe and Duct Support: Comply with MSS SP-58. Install supports and attachments as required to properly support piping. Arrange for grouping of parallel runs of horizontal piping, and support together.

1. Pipes of Various Sizes: Space supports for smallest pipe size or install intermediate supports for smaller-diameter pipes as specified for individual pipe hangers.

E. Security Grilles: Weld bar intersections and, using tamper-resistant bolts, attach the ends of bars to structural frame or primary curb walls.

F. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.5 CLEANING AND PROTECTION

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing in accordance with ASTM A780/A780M.

B. Touch up factory-primed surfaces with compatible primer ready for field painting.

C. On completion of installation, clean exposed surfaces in according with manufacturer's written instructions. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as roof accessories are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof accessories in a clean condition during construction.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures, as determined by Commissioner.

END OF SECTION 077200

SECTION 077273 - VEGETATED ROOF SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Tray-type vegetated roof assembly.

B. Related Requirements:

1. Section 077100 - Roof Specialties
2. Section 075600 - Cold Liquid Applied Polymethyl Methacrylate (PMMA) Hybrid Membrane Roofing
3. Section 077200 - Roof Accessories

1.3 DEFINITIONS

A. Captured Water: Water that is retained in the drainage layer of a vegetated roof assembly after new water additions have ceased and that cannot escape the roof except through evaporation or plant transpiration.

B. Finish Elevation: Elevation of finished growing-media surface of planting area.

C. Growing Medium: Manufactured, lightweight soil mixture that promotes good growing conditions for specific varieties of plants.

D. Planting Area: Areas to be planted.

E. Plant Material: Vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each vegetated roof assembly.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include material descriptions for each growing medium.

B. Sustainable Design Submittals:

1. Irrigation: Provide manufacturer information for installed irrigation system.
2. Irrigation: Provide manufacturer's cut sheets and calculations on irrigation systems indicating water usage rates and system efficiency.
3. Irrigation Submetering: Provide manufacturer cut sheets for irrigation metering equipment.
4. Native Planting, Action Submittals: Provide plant information indicating compliance with native and adapted planting requirements for rain gardens for rainwater management.

C. Shop Drawings: For each vegetated roof assembly.

1. Include plans, sections, slopes, and drain locations.
2. Indicate dimensions, weights, and loads.
3. Detail field assembly of components, depth of growing media, and attachments to other work.
4. Indicate walkway pavers locations of irrigation coordination with lighting and accessories.

D. Samples for Verification: For each of the following components of vegetated roof assembly:

1. Preplanted Vegetative Mat: 12 by 12 inches.
2. Growing Media: 1-pint volume of each growing medium, in sealed plastic bags labeled with content and source. Each Sample to be typical of the lots of growing media to be furnished. Provide an accurate representation of texture and composition.
3. Moisture-Retention Mat: 12 by 12 inches.
4. Drainage Panels: 12 by 12 inches.
5. Root Barrier: 12 by 12 inches.
6. Walkway paver, manufacturer's standard size, in each color and texture required; include installation accessories to illustrate assembly.
7. Geofoam Fill: 12 by 12 inches.
8. Separation Geotextile: 12 by 12 inches.
9. Access Boxes: One in each size and color required.
10. Soil Retainer: Manufacturer's standard size to verify configuration and color selected.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of manufactured product.

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory, in accordance with methods established by the Association of Official Analytical Chemists, where applicable.

C. Product Test Reports: For complete analysis of each growing medium, for tests performed by manufacturer and witnessed by a qualified testing agency or by a qualified testing agency.

D. Field quality-control reports.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: For vegetated roof assembly and plants, including a recommended maintenance plan with procedures for inspection and care during a calendar year. Submit before start of required warranty and maintenance periods.

B. Guarantee Service Agreement: From vegetated roof assembly Installer approved by roofing-membrane manufacturer to City of New York, in the form of a standard two-year Guarantee Service Agreement , starting on date of substantial completion . State services, obligations, conditions, and terms for agreement period.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: A qualified vegetated roof assembly Installer, approved, authorized, or licensed by roofing-membrane manufacturer, whose work has resulted in successful establishment of vegetated roofs.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and Federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials on or near structures, utilities, walkways and pavements, or existing roof areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of debris-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with product certificates.

C. Handle and store materials, and place equipment in a manner to avoid overloading roof structure or damaging roofing membrane.

1.11 FIELD CONDITIONS

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when optimum results may be obtained. Apply products during favorable weather conditions in accordance with manufacturer's written instructions and warranty requirements.

1.12 WARRANTY

A. Special Warranty for Vegetated Roof Assembly: Manufacturer agrees to repair or replace components of vegetated roof assembly that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, ponding water or prolonged wetness of growing medium caused as a result of failure of the assembly to properly drain.
2. Warranty Period: 10 years from date of Substantial Completion.

1.13 CONTRACTOR'S GUARANTY FOR PLANT GROWTH

A. Contractor's Guaranty for Plant Growth: Contractor to repair or replace plantings and accessories that fail in materials, workmanship, or growth within Contractor's Guaranty Obligation period.

1. Foliage Cover: Planted materials must grow to achieve and maintain at least 80 percent foliage cover over planting area commencing 24 months after planting, through the duration of this guaranty.
2. Failures include, but are not limited to, death and unsatisfactory growth except for defects resulting from abuse, lack of adequate maintenance, neglect by City of New York, or incidents that are beyond Contractor's control.
3. Guaranty Obligation Period: From date of Substantial Completion as follows:

   a. Trees and Shrubs: Two years.
   b. Ground Covers, Perennials, Vines, and Ornamental Grasses: Two years.

4. Include the following remedial actions as a minimum:

   a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
   b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of guaranty period.
   c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain vegetated roof assembly components growing medium geofoam fill and separation geotextile and accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Vegetated Roof Assembly: The entire vegetated assembly must be able to support vegetation and achieve 85 percent plant coverage of system within 24 months of installation.

B. Water Capacity: The entire vegetated assembly must be able to retain at least 1.3 gal/sq. ft. of water. This value includes the combined retention capacity of plantings and retention layers and is represented by the difference in weight between the dry system and the saturated system as per ASTM E2399-05.

C. Drainage: The entire vegetated assembly must be able to drain a rainfall of not less than 5 in./hr. (12.8 cm/hr.). Rainfall drainage capacity is based on the saturated hydraulic conductivity of growing media as per ASTM E 2399.

D. Dry Weight: The entire vegetated assembly must have dry weight of no less than 22 lb/sq. ft.

E. Saturated Weight: The entire vegetated assembly must have a saturated weight of no more than 45 lb/sq.ft.

2.3 VEGETATED ROOF ASSEMBLIES

A. Growing Medium: Manufactured, lightweight soil mixture that promotes good growing conditions for specific varieties of plants and complies with the following characteristics:

1. Sole Source Product: Xeroflor North America XF 398GM Media

a. No substitutions permitted.

2. Physical Properties

a. pH 6.0 - 8.5

b. Maximum water holding capacity 45%

c. By weight, medium makeup contains less than or equal to 10% silt, 2% clay, and 8% organic matter.

B. Water Retention Layer: a mechanically engineered, fire-resistant hygroscopic water retention layer. Which reserves water that is available for the vegetation, while excess moisture is released after a time-delay.

1. Sole Source Product: Xeroflor North America XF 499 Mineral Wool

a. No substitutions permitted.

2. Physical Properties:

a. Thickness: 1"
b. Water Capacity: >93%

C. Root Barrier: Heavy-duty blended linear polyethylene membrane, infused with carbon black additive for UV resistance. Use with Manufacturer’s recommended 4-inch (100 mm) technical seam tape. Heat welding is an option.

1. Sole Source Product: Xeroflor North America XF 140 Root Barrier.

a. No substitutions permitted.

2. Physical Properties:

   a. Thickness: 40 mil (1.00 mm)

3. Mechanical Properties:

   a. Tensile Strength, ASTM D 6693: 192 psi (336 N/cm).
   b. Tensile Elongation at Break (film break), ASTM D 6693: 900%
   c. Tear Resistance, ASTMK 1004: 24 lb. (107 N)
   d. Puncture Resistance, ASTM D 6241: 80 lbf (356 N)
   e. Oxidation Induction Time (OIT), ASTM D3895: 100 min
   f. Carbon Black, ASTM D4218: 2.4%
   g. 2% Secant Modulus, ASTM D5323: 30,000 psi (207 Mpa)

D. Technical Seam Tape: Self-adhered, waterproof membrane with acrylic pressure sensitive adhesive.

1. Sole Source Product: Xeroflor North America XF 801, XF 804.

   a. No substitutions permitted.

2. Physical Properties:

   a. Thickness: 9.9 mil (0.25 mm).

3. Mechanical Properties:

   a. Nail Sealability, ASTM E 331/547 (per AAMA 711-07, Annex 1): Pass both before and after thermal cycling.

E. Tray-Type Vegetated Roof Assembly : Modular assembly consisting of manufacturer's standardtrays for field assembly adjacent to and interlocking with each other over roofing system.

1. Sole Source Product: Xeroflor North America XF 506 Modular Tray

   a. No substitutions permitted.

2. Tray Depth, Nominal: 7.75 inches .
3. Tray Size: 15 by 20 inches .
4. Assembly Weight: Maximum 45 lbs/sq ft, including growing medium and plants, retention layer, and saturated with captured water, but not including weight of roofing system.
5. Assembly Weight Minimum: 22 lbs/sq ft dry weight
6. Plantings:Sedum as selected by Commissioner from manufacturer's standard varieties

F. Edging Restraint: Extruded aluminum L-shaped edging with perforations at the drainage course to allow for drainage and a solid surface at the growing level to prevent media and roots from contaminating the drainage level. To be used with Manufacturer’s connectors, corners and leveling strips.

1. Sole Source Product: Xeroflor North America XF 608.

   a. No substitutions permitted.

2. Physical Properties:

   a. Thickness: 80 mil (2.03 mm)
   b. Height: 8 in (152.40 mm).
   c. Flange Length: 4 in (101.60 mm).
   d. Length: 8 ft. (2.5 m).
   e. Perforations, diameter: 3/4 in (19 mm).

G. Drain Chamber: Aluminum Cover with lockable lid centered over roof drains to protect them from growing media, vegetation and external debris.

1. Sole Source Product: Xeroflor North America XF 708

   a. No substitutions permitted.

2. Physical Properties:

   a. Lid Dimensions: 15 inch x 15 inch
   b. Height: 10 inches

H. Drainage Layer: Three-dimensional, composite material made up of a drainage core of looped polyamide filaments bonded to a specially perforated, non-woven filter fabric.

1. Sole Source Product: Xeroflor North America XF 275

   a. No substitutions permitted.

2. Physical Properties:

   a. Thickness: 0.7 inches
   b. Water Flow Capacity: 500 psf: 17.5 gal/min/ft²

I. Filter Fabric: a highly permeable, non-woven, needle punched geo-textile separator used to ensure the soil is held in place and drainage layer is kept free of obstruction.

1. Sole Source Product: Xeroflor North America XF 403

   a. No substitutions permitted.

2. Physical Properties:

   a. Thickness: 45 mil

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine each area to receive vegetated roof assembly for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Verify that roof insulation over roofing membrane is in place, secure, and flush along all seams.
2. Verify that perimeter and other flashings are in place and secure along entire lengths where they will be covered by vegetated roof assembly.

B. Inspect growing medium.

1. Verify that no foreign or deleterious material or liquid, such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in growing medium within a planting area.
2. If growing medium is contaminated by foreign or deleterious material or liquid, remove growing medium and contamination and replace with new growing medium.

3.3 INSTALLATION, GENERAL

A. Protection Course: Cover roofing system with protection board with butted and fully taped joints before roofing system is subject to vegetated roof assembly installation work.

B. Install vegetated roof assembly as indicated in drawings and in accordance with manufacturer's written instructions.

C. Sloped Roofs: Install erosion-control fabric and anti-slip devices for slopes steeper than 1/2 inch per 12 inches in accordance with manufacturer's written instructions.

D. Small Plant Stabilization: Install erosion-control fabric over planting area to secure small plants in accordance with manufacturer's written instructions.

E. Access Boxes: Install access box at locations shown on Drawings. Install top of boxes 1 inch above the finish elevation of growing medium.

3.4 PLANTING

A. Perform planting in accordance with vegetated roof assembly manufacturer's written instructions.

B. Do not place growing medium or plants during frozen, wet, or muddy conditions.

C. Suspend spreading, grading, and planting operations during periods of excessive moisture until the moisture content in growing medium reaches acceptable levels to attain the required results.

D. Uniformly moisten an excessively dry growing medium that is too dusty or unworkable.

E. Preplanted Vegetative Mat: Install in full contact with growing medium and secure in position.

F. Site Planting: Plant vegetated roofs in accordance with requirements specified in Section 329300 "Plants" except as otherwise indicated on Drawings and required by vegetated roof assembly manufacturer's written instructions. Perform digging carefully to prevent damaging roofing system below the vegetated roof assembly.

G. Individual Plant Planting: Set out and space plants other than grasses and wildflowers as indicated on Drawings in even rows with triangular spacing.

1. Dig holes large enough to allow spreading of roots.
2. Free up or remove girdling roots.
3. Work growing medium around roots to eliminate air pockets.
4. Water thoroughly after planting, taking care not to cover plant crowns with wet growing medium.
5. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.5 INSTALLATION OF WALKWAY PAVERS

A. Installation: Install walkway pavers in accordance with manufacturer's written instructions.

B. Setting Bed: Install setting bed in accordance with paver manufacturer's written instructions.

C. Install paver supports in accordance with pedestal manufacturer's written instructions. Adjust for final level and slope with shims.

D. Loosely set walkway pavers, maintaining a uniform joint width. Tightly seat pavers against spacers to eliminate lateral movement or drift of paving assembly. Align joint patterns parallel in each direction.

1. Lay out pavers to avoid less-than-half-width pavers at perimeter or other terminations.

E. Tolerances: Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches and 1/4 inch in 10 feet from level, or indicated slope, for finished surface of paving.

3.6 INSTALLATION OF SOIL RETAINER

A. Install soil retainer where indicated in accordance with manufacturer's written instructions. Secure with adhesive.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests:

1. Electronic Leak-Detection Testing:

a. Testing shall be performed in accordance with ASTM D78770-14 (See Section 075600 Cold Liquid Applied Polymethyl Methacrylate (PMMA) Hybrid Membrane Roofing)

b. Testing agency will test each deck area for leaks using an electronic leak-detection method that locates discontinuities in the roofing membrane.

c. Testing agency will perform tests on abutting or overlapping smaller areas as necessary to cover entire test area.
d. Testing agency will provide survey report indicating locations of discontinuities if any.

2. Proceed with installation of vegetated roof assembly only after unsatisfactory conditions have been corrected.

B. Manufacturer's Field Service: Engage roofing-membrane manufacturer's authorized service representative to provide inspection of vegetated roof assembly installation and prepare inspection reports.

C. Correct deficiencies in work that do not comply with requirements.

D. Prepare test and inspection reports.

3.8 PROTECTION

A. Protect vegetated roof assemblies from damage, including growing-medium contamination, due to adjacent construction operations. Repair or replace damaged vegetated roof assemblies.

3.9 GUARANTEE SERVICE

A. Guarantee Service: Provide guarantee service by skilled employees of vegetated roof assembly Installer approved by roofing-membrane manufacturer. Begin guarantee service immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than the specified guarantee service period.

1. Assembly and Plant guarantee service : During guarantee service period, service plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing devices, resetting plants to proper elevations or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

a. Replace growing medium that becomes displaced or eroded because of settling or other processes.
b. Apply treatments as required to keep plant materials, planted areas, and growing medium free of pests and pathogens or disease. Use integrated past management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
c. Use only products and methods acceptable to roofing-membrane manufacturer.

2. Guarantee Service Period: 24 months from date of Substantial Completion.

END OF SECTION 077273

SECTION 078123 - INTUMESCENT FIRE PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Mastic and intumescent fire-resistive coatings.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review products, design ratings, restrained and unrestrained conditions, thicknesses, and other performance requirements.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Mastic and intumescent fire-resistive coatings.
2. Substrate primers.
3. Reinforcing fabric.
4. Reinforcing mesh.
5. Topcoat.

B. Sustainable Design Submittals:

1. Product Data: For paints and coatings, indicating VOC content.
2. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-emitting materials.
3. Health Product Declaration (HPD): Provide documentation confirming product compliance with one of the following:

a. Inventory or HPD to at least 0.01 percent by weight, with at least 95 percent assessed using GreenScreen Benchmark assessment.
b. Cradle to Cradle v3 certification with minimum Silver level of Material Health.
c. Living Product Challenge certification indicating achievement of Imperative 09, "Transparent Material Health."

C. Shop Drawings: Framing plans or schedules, or both, indicating the following:

1. Extent of fire protection for each construction and fire-resistance rating.
2. Applicable fire-resistance design designations of a qualified testing and inspecting agency.
3. Minimum mastic and intumescent fire-resistive coating thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
4. Treatment of mastic and intumescent fire-resistive coating after application.

D. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard dimensions in size.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of mastic and intumescent fire-resistive coating.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity certified, licensed, or otherwise qualified by mastic and intumescent fire-resistive coating manufacturer as experienced and with sufficient trained staff to install manufacturer's products in accordance with specified requirements.

C. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for materials and execution.

1. Build mockup of each type of fire protection and different substrate and each required finishas shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not apply fire protection when ambient or substrate temperature is 50 deg F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of fire protection, providing complete air exchanges in accordance with manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fire protection dries thoroughly.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Assemblies: Provide fire protection, including auxiliary materials, in accordance with requirements of each fire-resistance design and manufacturer's written instructions.

B. Fire-Resistance Design: Indicated on Drawings, tested in accordance with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Steel members are to be considered unrestrained unless specifically noted otherwise.
2. Product must have certified design for 1-hour protection of 2 1/2 inch nominal Schedule 40 pipe column. Extrapolated designs are not be acceptable.

C. Low-Emitting Materials: For field applications, coatings must comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Asbestos: Provide products containing no detectable asbestos.

2.2 MASTIC AND INTUMESCENT FIRE-RESISTIVE COATINGS

A. Mastic and Intumescent Fire-Resistive Coating : Manufacturer's standard, factory-mixed, multicomponent system consisting of intumescent base coat and topcoat, and complying with indicated fire-resistance design.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Carboline Company; a subsidiary of RPM International; Thermo-Lag E100S with Carbomastic 94MC or comparable product by one of the following:

    a. Albi Manufacturing; a division of StanChem, Inc.
    b. International Protective Coatings.
    c. PPG Paints; PPG Industries, Inc.
    d. Sherwin-Williams Company (The).
    e. Or approved equal.

2. Product Description: Two component, 95 percent solids epoxy intumescent fireproofing.
3. Application: Designated for "exterior", "interior general purpose", and "conditioned interior space purpose" use by a qualified testing agency.
4. Thickness: 60-120 mils (1.5-3.0 mm), as required for fire-resistance design indicated, measured in accordance with requirements of fire-resistance design.
5. Surface-Burning Characteristics: Comply with ASTM E84, Class A; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
6. Hardness: Not less than 40 , Type D durometer, in accordance with ASTM D2240.

7. Finish: Slightly textured.

   a. Color and Gloss: Grey.

2.3 AUXILIARY MATERIALS

A. Provide auxiliary materials that are compatible with mastic and intumescent fire-resistive coating and substrates and are approved by UL or another qualified testing and inspecting agency for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by mastic and intumescent fire-resistive coating manufacturer and complying with required fire-resistance design by UL or another qualified testing and inspecting agency.

C. Topcoat: Suitable for application over mastic and intumescent fire-resistive coating; of type recommended in writing by mastic and intumescent fire-resistive coating manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and in accordance with each fire-resistance design.

   1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fire protection with substrates under conditions of normal use or fire exposure.
   2. Verify that objects penetrating fire protection, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
   3. Verify that substrates receiving fire protection are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fire protection application.

B. Conduct tests in accordance with mastic and intumescent fire-resistive coating manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fire protection materials during application.

B. Clean substrates of substances that could impair bond of fire protection.

C. Prime substrates where included in fire-resistance design and where recommended in writing by mastic and intumescent fire-resistive coating manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection.

D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fire protection. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.4 APPLICATION

A. Construct fire protection assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, topcoats, finishing, and other materials and procedures affecting fire protection Work.

B. Comply with mastic and intumescent fire-resistive coating manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire protection; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Coordinate application of fire protection with other construction to minimize need to cut or remove fire protection.

1. Do not begin applying fire protection until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
2. Defer installing ducts, piping, and other items that would interfere with applying fire protection until application of fire protection is completed.

D. Install auxiliary materials as required, as detailed, and in accordance with fire-resistance design and mastic and intumescent fire-resistive coating manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by mastic and intumescent fire-resistive coating manufacturer.

E. Spray apply fire protection to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by mastic and intumescent fire-resistive coating manufacturer.

F. Extend fire protection in full thickness over entire area of each substrate to be protected.

G. Install body of fire protection in a single course unless otherwise recommended in writing by mastic and intumescent fire-resistive coating manufacturer.

H. Provide a uniform finish complying with description indicated for each type of fire protection material and matching finish approved for required mockups.

I. Cure fire protection in accordance with mastic and intumescent fire-resistive coating manufacturer's written instructions.

J. Do not install enclosing or concealing construction until after fire protection has been applied, inspected, and tested and corrections have been made to deficient applications.

K. Finishes: Where indicated, apply fire protection to produce the following finishes:

1. Manufacturer's Standard Finishes: Finish in accordance with manufacturer's written instructions for each finish selected.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: City of New York will engage a qualified special inspector to perform the following special inspections:

1. Test and inspect as required by the NYC Building Code and as indicated on Schedule of Special Inspections.

B. Do not proceed with application of fire protection for the next area until test results for previously completed applications of fire protection show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

C. Fire protection will be considered defective if it does not pass tests and inspections.

1. Remove and replace fire protection that does not pass tests and inspections, and retest.
2. Apply additional fire protection, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

D. Prepare test and inspection reports.

3.6 CLEANING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

3.7 PROTECTION

A. Protect fire protection, in accordance with advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fire protection is without damage or deterioration at time of Substantial Completion.

3.8 CORRECTIVE WORK

A. As installation of other construction proceeds, inspect fire protection and repair damaged areas and fire protection removed due to work of other trades.

B. Repair fire protection damaged by other work before concealing it with other construction.

C. Repair fire protection by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 078123

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

1. Section Includes:

   a. Penetration firestopping systems.
   b. Penetrations in fire-resistance-rated walls.
   c. Penetrations in horizontal assemblies.
   d. Penetrations in smoke barriers.
   e. Exposed penetration firestopping systems.

B. Related Requirements:

1. Section 078443 "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.
2. Section 079200 "Joint Sealants" for non-fire-resistance-rated joint sealants.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping systems when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping system materials in accordance with manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be accessed and installed in accordance with specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain penetration firestopping systems for each type of opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. A qualified testing agency must perform penetration firestopping system tests.
2. Test in accordance with testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Penetration firestopping systems installed with products bearing the classification marking of a qualified testing agency.

1) UL in its online directory "Product iQ."
2) Intertek Group in its "Directory of Building Products."
3) FM Approvals in its "Approval Guide."

B. Provide components for each penetration firestopping system that, upon curing, do not re-emulsify, dissolve, leach, break down, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water, or other forms of moisture characteristic during and after construction.

C. Provide components for each penetration firestopping system that do not contain ethylene glycol.

D. Provide components for each penetration firestopping system that are sufficiently flexible to accommodate movement, such as pipe vibration, water hammer, thermal expansion, and other normal building movement without damage.

E. Provide components for each penetration firestopping system that are appropriately tested for the thickness and type of insulation utilized.

2.3 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems must be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Fire Protection Products.
b. Everkem Diversified Products, Inc.
c. Hilti, Inc.
d. Specified Technologies, Inc.
e. Tremco, Inc.
f. Or approved equal.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined in accordance with ASTM E814 or UL 1479.

1. F-Rating: Not less than the fire-resistance rating of the wall penetrated.
2. Membrane Penetrations: Install recessed fixtures such that the required fire resistance will not be reduced.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined in accordance with ASTM E814 or UL 1479.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of the floor penetrated.
2. T-Rating: At least one hour, but not less than the fire-resistance rating of the floor. The following floor penetrations do not require a T-rating:

a. Those within the cavity of a wall.
b. Floor, tub, or shower drains within a concealed space.
c. 4-inch or smaller metal conduit penetrating directly into metal-enclosed electrical switchgear.

3. W-Rating: Provide penetration firestopping systems with a Class 1 W-rating in accordance with UL 1479.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined in accordance with UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84 or UL 723.

1. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.4 ACCESSORIES

A. Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated, including but not limited to:

1. Permanent forming/damming/backing materials.
2. Substrate primers.
3. Collars.
4. Steel sleeves.

2.5 FILL MATERIALS

A. Firestopping Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

B. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

C. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

D. Pillows/Bags: Compressible, removable, and reusable intumescent pillows encased in fire-retardant polyester or glass-fiber cloth. Where exposed, and when required by a listed system, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed or dislodged.

E. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

F. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

G. Wall-Opening Protective Materials: Intumescent, non-curing putty pads or self-adhesive inserts for protection of electrical switch and receptacle boxes.

H. Closet Flange Gasket: Molded, single-component, flexible, intumescent gasket for use beneath a water closet (toilet) flange in floor applications.

2.6 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings in accordance with manufacturer's written instructions and with the following requirements:

1. Remove foreign materials from substrate surfaces that could interfere with adhesion of penetration firestopping materials.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates in accordance with penetration firestopping system manufacturer's written installation instructions, using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.4 INSTALLATION

A. General: Install penetration firestopping systems in accordance with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.5 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 ft from end of wall and at intervals not exceeding 30 ft.

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: The City of New York will engage a qualified inspection agency to conduct and report on inspections in accordance with ASTM E2174, and as per requirements of the New York City Construction Code.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.7 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 078443 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Intumescent gypsum wall framing gaskets.
2. Joints in or between fire-resistance-rated constructions.
3. Joints at exterior curtain-wall/floor intersections.
4. Joints in smoke barriers.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers and for wall identification.
2. Section 092216 "Non-Structural Metal Framing" for firestop tracks for metal-framed partition heads.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

B. Unlisted Firestopping Systems: Obtain an Engineering Judgment (EJ) from firestop manufacturer where no UL, FM Approvals, or other listed assembly is available for particular firestop configuration. Follow International Firestop Council (IFC) recommended guidelines for evaluating firestop systems in EJs.

C. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's New York State licensed fire-protection engineer as an Engineering Judgment or equivalent fire-resistance-rated assembly developed in accordance with current IFC guidelines.

1.6 INFORMATIONAL SUBMITTALS

A. Listed System Designs: For each joint firestopping system, for tests performed by a qualified testing agency.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure joint firestopping systems in accordance with manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.9 COORDINATION

A. Coordinate construction of joints to ensure that joint firestopping systems can be installed in accordance with specified firestopping system design.

B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint firestop systems for each type of joint opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. A qualified testing agency will perform joint firestopping system tests.
2. Test in accordance with testing standards referenced in "Joint Firestopping System Types" Article. Provide rated systems complying with the following requirements:

a. Joint firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with listed system designs published by a qualified testing agency.

1) UL in its online directory "Product iQ."
2) Intertek Group in its "Directory of Building Products."

B. Rain/Water Resistance: For perimeter fire-barrier system applications, where inclement weather or greater-than-transient water exposure is expected, use products that dry rapidly and cure in the presence of atmospheric moisture sufficient to pass ASTM D6904 early rain-resistance test (24-hour exposure).

2.3 JOINT FIRESTOPPING SYSTEM TYPES

A. General: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems must accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

1. Joint firestopping systems that are compatible with one another, with the substrates forming openings, and with penetrating items, if any.
2. Provide products that, upon curing, do not re-emulsify, dissolve, leach, break down, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture.
3. Provide firestop products that do not contain ethylene glycol.

B. Intumescent Gypsum Wall Framing Gaskets: Applied to steel tracks, runners, and studs prior to framing installation. Provide products with fire, smoke, and acoustical ratings that allow movement of up to 100 percent compression and/or extension when tested in accordance with UL 2079 or ASTM E1966; have an L Rating of less than 1 cfm/ft. when tested in accordance with UL 2079; and a minimum Sound Transmission Class (STC) rating of 56 when tested in accordance with ASTM E90 or ASTM C919.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CEMCO; California Expanded Metal Products Co.
b. ClarkDietrich.
c. Specified Technologies, Inc.
d. Or approved equal.

C. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined in accordance with ASTM E1966 or UL 2079, with published L-Ratings for ambient and elevated temperatures as evidence of the ability of the fire-resistive joint system to restrict the movement of smoke.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Building and Construction.
b. ClarkDietrich.
c. Everkem Diversified Products, Inc.
d. Hilti, Inc.
e. Marino\\WARE.

f. Owens Corning.
g. RectorSeal Firestop; a CSW Industrials Company.
h. ROCKWOOL.
i. Specified Technologies, Inc.
j. Or approved equal.

D. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined in accordance with ASTM E2307.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Fire Protection Products.
b. Everkem Diversified Products, Inc.
c. Hilti, Inc.
d. Johns Manville; a Berkshire Hathaway company.
e. Owens Corning.
f. ROCKWOOL.
g. Specified Technologies, Inc.
h. Or approved equal.

2. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.

E. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined in accordance with UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Fire Protection Products.
b. Everkem Diversified Products, Inc.
c. Hilti, Inc.
d. MarinoWARE.
e. Owens Corning.
f. ROCKWOOL.
g. Specified Technologies, Inc.
h. Tremco, Inc.
i. Willseal LLC.
j. Or approved equal.

2. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.

F. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined in accordance with ASTM E84.

1. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

G. Accessories: Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Surface Cleaning: Before installing joint firestopping systems, clean joints immediately in accordance with fire-resistive joint system manufacturer's written installation instructions and the following requirements:

1. Remove foreign materials from substrate surfaces that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates in accordance with joint firestopping system manufacturer's written installation instructions, using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Apply a suitable bond-breaker to prevent three-sided adhesion in applications where this condition occurs.

3.4 INSTALLATION

A. General: Install joint firestopping systems in accordance with with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:

1. Apply elastomeric fill in voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.5 IDENTIFICATION

A. Wall Identification: Permanently label walls containing firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 ft. from end of wall and at intervals not exceeding 30 ft..

B. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: City of New York will engage a qualified testing agency to perform tests and inspections in accordance with ASTM E2393, as per the requirements of the New York City Construction Code.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.7 CLEANING AND PROTECTION

A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated joint firestopping systems immediately and install new materials to produce joint firestopping systems complying with specified requirements.

END OF SECTION 078443

SECTION 079100 - PREFORMED JOINT SEALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Extruded-silicone joint seals.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for liquid sealants applied over preformed seals in dual-seal systems.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Preformed, foam joint seals.
2. Extruded-silicone joint seals.

B. Samples for Initial Selection: Manufacturer's color sheets, showing full range of available colors for each type of exposed preformed joint seal.

C. Samples for Verification: Actual samples of each type and color of exposed preformed joint seal.

1. Size: 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint seals.

D. Preformed Joint Seal Schedule: Include the following information:

1. Joint seal location and designation.
2. Joint width and movement capability.

3. Joint seal manufacturer and product name.
4. Joint seal color.

1.6 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports:

1. Product Test Reports: For each preformed joint seal, for tests performed by qualified testing agency.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 MOCKUPS

A. Build mockups to verify selections made under Sample submittalsto demonstrate aesthetic effectsandto set quality standards for materials and execution.

1. Build mockup As required by Commissioner.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer agrees to furnish preformed joint seals to repair or replace those that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. For preformed joint seals, obtain each color, type, and variety of joint seal from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 EXTRUDED-SILICONE JOINT SEALS

A. Extruded-Silicone Joint Seals GASKET-01: Manufacturer's standard seal consisting of precured low-modulus silicone extrusion, with a neutral-curing silicone sealant for bonding extrusions to substrates.

1. Basis-of-Design Product: Subject to compliance with requirements, provide products by one of the following:

a. GE Construction Sealants; Momentive Performance Materials Inc.

b. Pecora Corporation.
c. The Dow Chemical Company.
d. Or approved equal.

2. Joint Seal Width: As indicated by manufacturer's designations .
3. Joint Seal Color: As selected by Commissioner from full range of industry colors.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine joints indicated to receive preformed joint seals, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting preformed joint seal performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PROTECTION

A. Protect preformed joint seals from damage resulting from construction operations or other causes so seals are without deterioration or damage at time of Substantial Completion.

B. Cut out, remove, and repair damaged or deteriorated seals so repaired areas are indistinguishable from original work.

END OF SECTION 079100

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Latex joint sealants.

B. Related Requirements:

1. Section 079100 "Preformed Joint Seals" for preformed compressible foam and precured joint seals.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Joint-sealants.
2. Joint sealant backing materials.

B. Samples for Initial Selection: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.

2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.6 INFORMATIONAL SUBMITTALS

A. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:

1. Joint-sealant location and designation.
2. Manufacturer and product name.
3. Type of substrate material.
4. Proposed test.
5. Number of samples required.

B. Preconstruction Laboratory Test Reports: For each joint sealant and substrate material to be tested from sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.

C. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

D. Field Quality-Control Reports: For field-adhesion-test reports, for each sealant application tested.

1.7 CLOSEOUT SUBMITTALS

A. Manufacturers' special warranties.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installers: trained and approved by manufacturer.

C. Testing Agency: Qualified in accordance with ASTM C1021 to conduct the testing indicated.

1.9 MOCKUPS

A. Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.10 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.11 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

B. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint sealants from single manufacturer for each sealant type.

2.2 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Commissioner from manufacturer's full range.

2.3 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. GE Construction Sealants; Momentive Performance Materials Inc.
b. Sika Corporation; Joint Sealants.
c. The Dow Chemical Company.
d. Or approved equal.

2.4 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.
    d. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.4 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

    1. Do not leave gaps between ends of sealant backings.
    2. Do not stretch, twist, puncture, or tear sealant backings.
    3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants in accordance with requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.
4. Provide flush joint profile at locations indicated on Drawings in accordance with Figure 8B in ASTM C1193.
5. Provide recessed joint configuration of recess depth and at locations indicated on Drawings in accordance with Figure 8C in ASTM C1193.

a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

a. Extent of Testing: Test completed and cured sealant joints as follows:

1) Perform 5 tests for the first 1000 ft. of joint length for each kind of sealant and joint substrate.
2) Perform one test for each 1000 ft. of joint length thereafter or one test per each floor per elevation.

b. Test Method: Test joint sealants in accordance with Method A, Tail Procedure, in ASTM C1521.

1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

c. Inspect tested joints and report on the following:

1) Whether sealants filled joint cavities and are free of voids.
2) Whether sealant dimensions and configurations comply with specified requirements.

3) Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.

d. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.

e. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

2. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

C. Prepare test and inspection reports.

3.6 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.7 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Interior standard steel doors and frames.
2. Exterior standard steel doors and frames.
3. Interior custom hollow-metal doors and frames.
4. Exterior custom hollow-metal doors and frames.

B. Related Requirements:

1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.7 ACTION SUBMITTALS

A. Product Data Submittals: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

C. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.8 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of fire-rated hollow-metal door and frame assembly thermally rated door assemblies for tests performed by a qualified testing agency indicating compliance with performance requirements.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.
2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

B. Fire-Rated, Borrowed-Lite Assemblies: Assemblies complying with NFPA 80 and listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing in accordance with NFPA 257 or UL 9.

C. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.38 deg Btu/F x h x sq. ft. when tested in accordance with ASTM C518.

2.2 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B. At locations indicated in the Door and Frame Schedule on Drawings.

1. Doors:

a. Type: As indicated in the Door and Frame Schedule on Drawings.
b. Thickness: 1-3/4 inches.
c. Face: Uncoated steel sheet, minimum thickness of 0.042 inch.
d. Edge Construction: Model 1, Full Flush.
e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
f. Core: Manufacturer's standard.
g. Fire-Rated Core: Manufacturer's standard vertical steel stiffener laminated mineral board core for fire-rated doors.

2. Frames:

a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
c. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.3 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A. At locations indicated in the Door and Frame Schedule on Drawings.

1. Doors:

a. Type: As indicated in the Door and Frame Schedule on Drawings.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
d. Edge Construction: Model 1, Full Flush.
e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
h. Core: Manufacturer's standard.
i. Fire-Rated Core: Manufacturer's standard core for fire-rated doors.

2. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
b. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.4 INTERIOR CUSTOM HOLLOW-METAL DOORS AND FRAMES

A. Hollow-Metal Doors and Frames: NAAMM-HMMA 860; ANSI/SDI A250.4, Physical Performance Level A. At locations indicated in the Door and Frame Schedule on Drawings.

1. Doors:

a. Type: As indicated in the Door and Frame Schedule on Drawings.
b. Thickness: 1-3/4 inches.
c. Face: Uncoated steel sheet, minimum thickness of 0.042 inch.
d. Edge Construction: Continuously welded with no visible seam.
e. Core: Steel stiffened.
f. Fire-Rated Core: Manufacturer's standard vertical steel stiffener laminated mineral board core for fire-rated doors.

2. Frames:

a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
c. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.5 EXTERIOR CUSTOM HOLLOW-METAL DOORS AND FRAMES

A. Commercial Doors and Frames: NAAMM-HMMA 861; ANSI/SDI A250.4, Physical Performance Level A. At locations indicated in the Door and Frame Schedule on Drawings.

1. Doors:

a. Type: As indicated in the Door and Frame Schedule on Drawings.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum G60 or A60 coating.
d. Edge Construction: Continuously welded with no visible seam.
e. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
f. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.

2. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, except 0.067 inch for openings exceeding 4 feet wide; with minimum G60 or A60 coating.
b. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.6 HOLLOW-METAL PANELS

A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.7 FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
3. Postinstalled Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.

D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

2.8 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

G. Glazing: Comply with requirements in Section 088000 "Glazing."

2.9 FABRICATION

A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding, or by rigid mechanical anchors.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule on Drawings, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted hairline joints.

1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.10 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.11 LOUVERS

A. Provide louvers for interior doors, where indicated, which comply with SDI 111, with blades or baffles formed of 0.020-inch- thick, cold-rolled steel sheet set into 0.032-inch- thick steel frame.

1. Sightproof Louver: Stationary louvers constructed with inverted-V or inverted-Y blades.

B. Form corners of moldings with hairline joints. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11 or NAAMM-HMMA 840.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.

    a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
    b. Install frames with removable stops located on secure side of opening.

2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
3. Floor Anchors: Secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

4. Solidly pack mineral-fiber insulation inside frames.
5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8 orNAAMM-HMMA 841 and NAAMM-HMMA guide specification indicated.
2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.
3. Smoke-Control Doors: Install doors in accordance with NFPA 105.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.4 CORRECTIVE WORK

A. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Access doors and frames.
2. Fire-rated access doors and frames.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches in size.

C. Product Schedule: For access doors and frames. Use same designations indicated on Drawings.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES

A. Flush Access Doors with Concealed Flanges :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Acudor Products, Inc.
   b. Babcock-Davis.
   c. JL Industries, Inc.; a division of the Activar Construction Products Group.
   d. Karp Associates, Inc.
   e. Or approved equal.

2. Description: Face of door flush with frame with concealed flange for gypsum board installation and concealed hinge.
3. Optional Features: Piano hinges, Masonry anchors, and Removable doors.
4. Locations: Wall and Ceiling.
5. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed.
6. Metallic-Coated Steel Sheet for Door for Moisture-prone Areas: Nominal 0.064 inch, 16 gage factory finished.
7. Frame Material: Same material and thickness as door.
8. Latch and Lock: Screwdriver-operated Cam latch and Hex-head wrench-operated Cam latch.

2.3 FIRE-RATED ACCESS DOORS AND FRAMES

A. Fire-Rated, Flush Access Doors with Concealed Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Acudor Products, Inc.
   b. Babcock-Davis.
   c. JL Industries, Inc.; a division of the Activar Construction Products Group.
   d. Karp Associates, Inc.
   e. Or approved equal.

2. Description: Door face flush with frame with concealed flange for gypsum board installation, self-closing door, and concealed hinge.
3. Optional Features: Upward-opening doors at ceilings and Gasketing.
4. Locations: Wall and Ceiling.
5. Fire-Resistance Rating: Not less than that of adjacent construction.
6. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage, factory primed.

2.4 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.

C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

D. Frame Anchors: Same material as door face.

E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.5 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded-metal lath and exposed casing bead welded to perimeter of frames.

D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling. Provide access sleeves for each latch operator and install in holes cut through finish.

1. For recessed doors with plaster infill, provide self-furring expanded-metal lath attached to door panel.

E. Latch and Lock Hardware:

1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
2. Keys: Furnish two keys per lock and key all locks alike.
3. Mortise Cylinder Preparation: Where indicated, prepare door panel to accept cylinder specified in Section 087100 "Door Hardware."

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
2. Factory Finished: Apply manufacturer's standard baked-enamel or powder-coat finish immediately after cleaning and pretreating, with minimum dry-film thickness of 1 mil for topcoat.

a. Color: As selected by Commissioner from full range of industry colors.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

3.4 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

SECTION 083123 - FLOOR DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Steel floor doors at detention tank.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

B. Product Schedule: For floor doors. Use same designations indicated on Drawings.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Floor Doors: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency according to NFPA 288.

2.2 STEEL FLOOR DOORS

A. Gutter Channel Frame Steel Floor Door:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Babcock-Davis.
b. BILCO Company (The).
c. Nystrom.
d. U.S.F. Fabrication.
e. Or approved equal.

2. Frame: Hot-dip galvanized steel, gutter profile, with integral drainage coupling and perimeter gasket.
3. Door: Single leaf; manufacturer's standard thickness, diamond pattern; hot-dip galvanized steel plate.
4. Loading Capacity: 300 lbf/sq. ft. pedestrian live load AASHTO H20 concentrated wheel load.
5. Options: Debris gasket.
6. Hardware:

a. Material and Finish: Type 316 stainless steel, including latch and lifting mechanism assemblies, hold-open arms, and brackets, hinges, pins, and fasteners.
b. Hinges: Heavy-duty butt hinges with stainless steel pins.
c. Operating Mechanism: Adjustable counterbalancing springs, heavy-duty hold-open arm that automatically locks door open at 90 degrees, release handle with vinyl grip that allows for one-handed closure, and recessed lift handle.
d. Latch: Stainless steel slam latch.
e. Lock: Latch with removable handle.

2.3 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G90 coating.

C. Frame Anchors: Same material as door face.

D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.4 FABRICATION

A. General: Provide floor doors manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure floor doors to types of supports indicated.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder locks, furnish two keys per lock and key all locks alike.
2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Hot-dip galvanize items to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions for installing floor doors.

3.4 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083123

SECTION 084213 - ALUMINUM-FRAMED ENTRANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Aluminum-framed entrance door systems.

B. Related Requirements:

1. Section 079100 - Preformed Joint Seals
2. Section 079200 - Joint Sealants
3. Section 084413 - Glazed Aluminum Curtain Walls
4. Section 087100 - Door Hardware
5. Section 088000 - Glazing
6. Section 088853 - Security Glazing

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data Submittals: For each product.

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings:

1. Plans, elevations, sections, full-size details, and attachments to other work.
2. Details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.

3. Full-size isometric details of each type of vertical-to-horizontal intersection of aluminum-framed entrance door systems, showing the following:

    a. Joinery, including concealed welds.
    b. Anchorage.
    c. Expansion provisions.
    d. Glazing.
    e. Flashing and drainage.

4. Connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
5. Point-to-point wiring diagrams showing the following:

    a. Power requirements for each electrically operated door hardware.
    b. Location and types of switches, signal device, conduit sizes, and number and size of wires.

6. Signed and sealed by the qualified professional engineer licensed in the state of New York responsible for their preparation.

C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of exposed finish.

D. Samples for Verification: Actual sample of finished products for each type of exposed finish.

1. Size: Manufacturers' standard size.

E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:

1. Joinery, including concealed welds.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

F. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

G. Engineering Services Submittals: For aluminum-framed entrances and storefront systems, including analysis data signed and sealed by the New York State licensed professional engineer responsible for their preparation.

H. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
3. Environmental Product Declaration: For each product.
4. Health Product Declaration: For each product.
5. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

1.6 INFORMATIONAL SUBMITTALS

A. Energy Performance Certificates: For aluminum-framed entrance door systems, accessories, and components, from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance.

B. Product Test Reports: For aluminum-framed entrance door systems, for tests performed by a qualified testing agency.

C. Field Quality-Control Reports: For aluminum-framed entrance door systems.

D. Qualification Statements:

1. For Installer and field testing agency and egress door inspector.

E. Sample Warranties: For aluminum-framed entrance door systems.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For aluminum-framed entrance door systems.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/1, as well as the additional criteria below.

1. Entity that employs installers and supervisors who are trained and approved by manufacturer.

C. Testing Agency Qualifications: Qualified in accordance with ASTM E699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025.

D. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Commissioner, except with Commissioner's approval. If changes are proposed, submit comprehensive explanatory data to Commissioner for review.

1.9 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrance door systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures.
   b. Faulty operation of components.

2. Warranty Period: 10 years from date of Substantial Completion.

B. Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

   a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
   b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 20 years from date of Substantial Completion.

C. Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

   a. Color fading more than 5 Delta E units when tested in accordance with ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D 4214.
   c. Cracking, peeling, or chipping.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain all components of aluminum-framed entrance door systems, including framing, security glazing channel, and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer, licensed in the State of New York as defined in DDC General Conditions, to design aluminum-framed entrance door systems.

B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrance door systems representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances to withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

    a. Thermal stresses transferring to building structure.
    b. Glass breakage.
    c. Noise or vibration created by wind and thermal and structural movements.
    d. Loosening or weakening of fasteners, attachments, and other components.
    e. Failure of operating units.

C. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

D. Structural: Test in accordance with ASTM E330/E330M as follows:

1. When tested at 150 percent of positive and negative wind-load design pressures, entrance doors, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
2. Test Durations: As required by design wind velocity, but not less than 10 seconds.

E. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas of entrance doors when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft..

F. Energy Performance: Certified and labeled by manufacturer for energy performance as follows:

1. Thermal Transmittance (U-factor):

    a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.69 Btu/sq. ft. x h x deg F 0.30 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.
    b. Entrance Doors: U-factor of not more than 0.77 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.

2. Solar Heat-Gain Coefficient (SHGC):

    a. Fixed Glazing and Framing Areas: SHGC for the system of not more than 0.35 as determined in accordance with NFRC 200.
    b. Entrance Doors: SHGC of not more than 0.35 as determined in accordance with NFRC 200.
    c. Security Glazing Channel to have ventilation adequate to eliminate heat buildup in cavity. Perform testing as required.

3. Air Leakage:

a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft. when tested in accordance with ASTM E283.
b. Entrance Doors: Air leakage of not more than 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..

4. Condensation Resistance Factor (CRF):

a. Fixed Glazing and Framing Areas: CRF for the system of not less than 55 as determined in accordance with AAMA 1503.
b. Entrance Doors: CRF of not less than 57 as determined in accordance with AAMA 1503.
c. Security Glazing Channel to have ventilation adequate to eliminate condensation in cavity. Perform testing as required.

G. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.3 ALUMINUM-FRAMED ENTRANCE DOOR SYSTEMS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Reynaers; MasterLine 8 Entrance Door or comparable product by one of the following:

1. Arcadia, Inc.
2. Kawneer Company, Inc.; Arconic Corporation.
3. OldCastle BuildingEnvelope (OBE).
4. Pittco Architectural Metals, Inc.
5. U.S. Aluminum; C.R. Laurence Co., Inc.; CRH Americas, Inc.
6. Or approved equal.

B. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.

1. Door Construction: 3"overall thickness with minimum 0.07 inch thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.

2. Door Design: As indicated.
3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets as recommended by manufacturer

a. Provide nonremovable glazing stops on outside of door.

4. Door Finish: Superior-performance organic finish to match adjacent curtain wall framing

C. Framing Members: Manufacturer's standard extruded aluminum, minimum 0.07 inch 18 thick and reinforced as required to support imposed loads.

1. Nominal Size: As indicated on Drawings.
2. Exterior Framing Construction: Thermally broken.
3. Interior Vestibule Framing Construction: Nonthermal.
4. Finish: Match door finish.

D. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

E. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

F. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

   a. Sheet and Plate: ASTM B209.
   b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
   c. Structural Profiles: ASTM B308/B308M.

2. Steel Reinforcement:

   a. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
   b. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
   c. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

3. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

2.4 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

2.5 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers. Comply with Section 088000 "Glazing." and Section 079100 - "Preformed Joint Seals."

C. Glazing Sealants: As recommended by manufacturer. Comply with Section 088000 "Glazing." and Section 079200 - "Joint Sealants."

1. Sealant must have a VOC content of 250 g/L or less.

2. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.6 SECURITY GLAZING CHANNEL

A. Security Glazing Channel: Aluminum channel provided by entrance door manufacturer designed to capture security glazing sheet and integrate into entrance door system.

1. Size to fit standard security glazing depth. Comply with Section 088853 - Security Glazing.
2. Provide venting sufficient to create pressure equalized cavity and to minimize heat buildup and condensation. Perform testing as required to verify solar heat gain performance and condensation risk.
3. Provide filtration at cavity vents to inhibit dirt and dust. Perform long term testing to assure filtration is adequate to eliminate dirt buildup.
4. Engineer security glazing channel and connections to glazing system to withstand self-weight, windload and other performance requirements of Glazing system.

2.7 ACCESSORIES

A. Automatic Door Operators: Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system, fabricated from 300 series stainless steel.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.

C. Concealed Flashing: Dead-soft, 0.018-inch- thick stainless steel, complying with ASTM A240/A240M, of type recommended by manufacturer.

D. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At interior and exterior doors, provide compression weather stripping at fixed stops.

E. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

F. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

G. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.9 ALUMINUM FINISHES

A. For all exposed interior surfaces: Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color and Gloss: As selected by Commissioner from manufacturer's full range.

B. For all exposed exterior surfaces: Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.

1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
2. Color and Gloss: As selected by Commissioner from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF ALUMINUM-FRAMED ENTRANCE DOOR SYSTEMS

A. Comply with manufacturer's written instructions.

B. Do not install damaged components.

C. Fit joints to produce hairline joints free of burrs and distortion.

D. Rigidly secure nonmovement joints.

E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

F. Seal perimeter and other joints watertight unless otherwise indicated.

G. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

H. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.

I. Install joint filler behind sealant as recommended by sealant manufacturer.

J. Install components plumb and true in alignment with established lines and grades.

K. Install entrance doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

L. Install glazing as specified in Section 088000 "Glazing."

3.4 FIELD QUALITY CONTROL

A. Tests: Testing Agency to perform the following tests on aluminum-framed entrance door systems.

1. Air Leakage: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
2. Water Penetration: ASTM E1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and to not evidence water penetration.
3. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Commissioner to be tested in accordance with AAMA 501.2 and to not evidence water penetration.
4. Chamber Tests (ASTM E1186/air & ASTM E 783/water) should occur first on a select number of aluminum framed entrances, while AAMA 501.2 should be conducted last only if those chamber tests fail, and AND on all otherwise untested aluminum framed entrances - refer to specification 019119.43.

B. Inspections:

1. Egress Door Inspections: Inspect each aluminum-framed entrance door equipped with panic hardware, located in an exit enclosure, electrically controlled, and equipped with special locking arrangements, in accordance with NFPA 101, Ch. 7 "Means of Egress," Section "Means of Egress Components," Article "Inspection of Door Openings."

C. Aluminum-framed entrance door systems will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 GUARANTY SERVICE

A. Entrance Door Hardware Guaranty Service:

1. Tools and Instructions: Furnish a complete set of specialized tools and instructions as needed for City of New York's continued adjustment, service, and removal and replacement of entrance door hardware.
2. Initial Guaranty Service: Beginning at Substantial Completion, provide six months' full guaranty service by skilled employees of entrance door hardware Installer. Include repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

END OF SECTION 084213

SECTION 084413 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Glazed aluminum curtain wall systems:

   a. Conventionally glazed.
   b. Venting windows with four sided , structural-sealant-glazed.
   c. Security Glazing Profiles

B. Related Requirements:

1. Section 078443 "Joint Firestopping" perimeter fire-containment systems (safing insulation) field installed with glazed aluminum curtain walls.
2. Section 079200 "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain walls and for sealants to the extent not specified in this Section.
3. Section 088000 "Glazing" for curtain wall glazing.
4. Section 088853 "Security Glazing"

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

B. Participants: Contractor, Curtain Wall Installer, Insulation Installer, Air Barrier Installer, Waterproofing Installer, Roofing Installer, Mason , and any other trades that have scope adjacent to or overlapping glazed aluminum curtain wall.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For glazed aluminum curtain walls and mockups. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each type of vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:

a. Joinery, including concealed welds.
b. Anchorage.
c. Expansion provisions.
d. Glazing.
e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:

1. Joinery, including concealed welds.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

F. Engineering Services Submittal: For glazed aluminum curtain walls, including analysis data signed and sealed by the qualified New York State licensed professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Mockup Testing Submittals:

1. Testing Program: Developed specifically for Project.
2. Test Reports: Prepared by a qualified preconstruction testing agency for each mockup test.
3. Record Drawings: As-built drawings of preconstruction laboratory mockups showing changes made during preconstruction laboratory mockup testing.

B. Qualification Data:

1. For Installer and laboratory mockup testing agency and field testing agency.
2. For professional engineer's experience with providing engineering services of the kind indicated.

C. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.

D. Product Test Reports: For glazed aluminum curtain walls, for tests performed by a qualified testing agency.

E. Quality-Control Program: Developed specifically for Project, including fabrication and installation, in accordance with recommendations in ASTM C1401. Include periodic quality-control reports.

F. Source quality-control reports.

G. Field quality-control reports.

H. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.

B. Maintenance Data for Structural Sealant: For structural-sealant-glazed curtain walls to include in maintenance manuals. Include ASTM C1401 recommendations for post-installation-phase quality-control program.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/1.

C. Laboratory Mockup Testing Agency Qualifications: Qualified in accordance with ASTM E699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025.

D. Testing Agency Qualifications: Qualified in accordance with ASTM E699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025 and acceptable to Commissioner.

E. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Commissioner, except with Commissioner's approval. If changes are proposed, submit comprehensive explanatory data to Commissioner for review.

F. Structural-Sealant Glazing: Comply with ASTM C1401 for design and installation of structural-sealant-glazed curtain wall assemblies.

1.9 MOCKUPS

A. Build mockups as required by Commissioner to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall area as diagrammed on A-350.
2. Testing must be performed on mockups in accordance with requirements in "Field Quality Control" Article.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on laboratory mockups.

1. Build preconstruction laboratory mockups at testing agency facility; use personnel, products, and methods of construction that will be used at Project site.
2. Size and Configuration: As determined by commissioner. Mockup to include horizontal and vertical joint, largest vertical span, attachment to structure, operable window and spandrel panel.
3. Notify Commissioner seven days in advance of the dates and times when preconstruction laboratory mockups will be constructed and tested.

B. Preconstruction Laboratory Mockup Testing: Test preconstruction laboratory mockups according to requirements in "Performance Requirements" Article. Perform the following tests in the following order:

1. Structural, 50 percent: ASTM E330/E330M at 50 percent of positive test load.
2. Air Leakage: ASTM E283.
3. Water Penetration under Static Pressure: ASTM E331.
4. Water Penetration under Dynamic Pressure: AAMA 501.1.
5. Structural, 100 percent: ASTM E330/E330M at 100 percent of positive and negative test loads. Repeat the following:

   a. Air Leakage: ASTM E283.
   b. Water Penetration under Static Pressure: ASTM E331.

6. Interstory Drift: AAMA 501.4 at 100 percent of design displacement. Repeat the following:

   a. Air Leakage: ASTM E283.
   b. Water Penetration under Static Pressure: ASTM E331.

7. Vertical Interstory Movement: AAMA 501.7. Repeat the following:

   a. Air Leakage: ASTM E283.

b. Water Penetration under Static Pressure: ASTM E331.

8. Thermal Cycling: In accordance with AAMA 501.5. Repeat the following:

a. Air Leakage: ASTM E283.
b. Water Penetration under Static Pressure: ASTM E331.

9. Structural, 100 and 150 percent: ASTM E330/E330M at 100 and 150 percent of positive and negative test loads. Repeat the following:

a. Air Leakage: ASTM E283.
b. Water Penetration under Static Pressure: ASTM E331.

C. Preconstruction Adhesion and Compatibility Testing: Submit to structural glazing sealant manufacturer, for testing indicated below, Samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that is in close proximity to or is touching the structural or nonstructural sealants of a structural glazed system.

1. Compatibility: Test materials or components using ASTM C1087.
2. Adhesion: Test for adhesion or lack of adhesion of a structural sealant to the surface of another material or component using ASTM C1135.
3. Submit no fewer than four pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
6. Testing will not be required if data based on previous testing of current sealant products match those submitted.

1.11 WARRANTY

A. Special Assembly Warranty: Manufacturer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection, water leakage, air infiltration or condensation .
b. Noise or vibration created by wind and thermal and structural movements.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
d. Water penetration through fixed glazing and framing areas.
e. Failure of operating components.
f. Failure of insulating glass.
g. Failure to meet performance requirements.

2. Warranty Period 10 years from date of Substantial Completion.

B. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of baked enamel, powder coat, or organic finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

    a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
    b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
    c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 20 years from date of Substantial Completion.

C. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

    a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
    b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
    c. Cracking, peeling, or chipping.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design glazed aluminum curtain walls.

B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Glazed aluminum curtain walls must withstand movements of supporting structure, including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

    a. Thermal stresses transferring to building structure.
    b. Glass breakage.
    c. Noise or vibration created by wind and thermal and structural movements.
    d. Loosening or weakening of fasteners, attachments, and other components.
    e. Failure of operating units.

C. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

D. Deflection of Framing Members Supporting Glass: At design wind load, as follows:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span or max 3/4" for spans of up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans of greater than 13 feet 6 inches.
2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.

    a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.

3. Cantilever Deflection: Limited to 2/175 at unsupported cantilevers.

E. Structural: Test in accordance with ASTM E330/E330M as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

F. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft..

G. Water Penetration under Dynamic Pressure: Test in accordance with AAMA 501.1 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft..
2. Maximum Water Leakage: In accordance with AAMA 501.1 No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters or water that is drained to exterior.

H. Interstory Drift: Accommodate design displacement of adjacent stories indicated.

1. Design Displacement: As indicated on Drawings.
2. Test Performance: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.4 at design displacement.

I. Seismic Performance: Glazed aluminum curtain walls must withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.6 at design displacement.
2. Vertical Interstory Movement: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.7 at design displacement.

J. Energy Performance: Certified and labelled by manufacturer for energy performance as follows:

1. Thermal Transmittance (U-factor):

    a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.30 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.
    b. Venting Windows: Whole window U-factor of not more than 0.40 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.

2. Solar Heat Gain Coefficient (SHGC):

    a. Fixed Glazing and Framing Areas: SHGC for the system of not more than 0.36 as determined in accordance with NFRC 200.
    b. Venting Windows: Whole-window SHGC of not more than 0.36 as determined in accordance with NFRC 200.
    c. Security Glazing Channel to have ventilation adequate to eliminate heat buildup in cavity. Perform testing as required.

3. Air Leakage:

    a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft. when tested in accordance with ASTM E283.
    b. Venting Windows: Whole-window air leakage of not more than 0.3 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft. when tested in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

4. Condensation Resistance Factor (CRF):

    a. Fixed Glazing and Framing Areas: CRF for the system of not less than 55 as determined in accordance with AAMA 1503.
    b. Venting Windows: Whole-window CRF of not less than 55 as determined in accordance with AAMA 1503.
    c. Security Glazing Channel to have ventilation adequate to eliminate condensation in cavity. Perform testing as required.

K. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

L. Structural-Sealant Joints:

1. Designed to carry gravity loads of glazing.

M. Structural Sealant: ASTM C1184. Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed curtain walls without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant must occur before adhesive failure.

1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.

2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate, because sealant-to-substrate bond strength exceeds sealant's internal strength.

2.2 SOURCE LIMITATIONS

A. Obtain all components of curtain-wall system and storefront system, including framing, spandrel panels, venting windows, entrances, sun control, security glazing channel, and accessories, from a single manufacturer.

2.3 GLAZED ALUMINUM CURTAIN WALL SYSTEMS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Reynaers; Concept Wall 50 or comparable product by one of the following:

1. Shuco USA LP
2. Bisam Facade
3. Or approved equal.

B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.
4. Finish: Baked-enamel or powder-coat finish Superior-performance organic finish.
5. System: Stick system.
6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
7. Steel Reinforcement: As required by manufacturer.

C. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.

1. Include snap-on aluminum trim that conceals fasteners.

D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

E. Insulated Spandrel Panels:

1. Laminated, metal-faced flat panels with no deviations in plane exceeding 0.8 percent of panel dimension in width or length.

a. Overall Panel Thickness: As indicated.
b. Exterior Skin: Aluminum.

1) Thickness: Manufacturer's standard for finish and texture indicated.
2) Finish: Match framing system.
3) Texture: Smooth.

c. Interior Skin: Aluminum.

1) Thickness: Manufacturer's standard for finish and texture indicated.
2) Finish: Mill finish.

d. Thermal Insulation Core: Manufacturer's standard expanded-perlite, mineral-insulation board.
e. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1) Flame-Spread Index: 25 or less.
2) Smoke-Developed Index: 50 or less.

F. Venting Windows:

1. Manufacturer's standard units, complying with AAMA/WDMA/CSA 101/I.S.2/A440, with self-flashing mounting fins, and as follows:

a. Window Type: As indicated on Drawings.
b. Minimum Performance Class: CW.
c. Minimum Performance Grade: 60.
d. Hardware: Manufacturer's standard; of aluminum, stainless steel, die-cast steel, malleable iron, or bronze; including the following:

1) Cam handle locking system.
2) Multi-point locking system.
3) Pole-operated, cam handle locking system, where rail is more than 72 inches above floor.
4) Rotary operator.
5) Limit Devices: Concealed friction adjustor and adjustable stay bar limit devices designed to restrict sash opening.

a) Limit clear opening to 4 inches for ventilation; with custodial key release.

e. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

f. Glazing: As specified in Section 088000 "Glazing".
g. Finish: Match adjacent glazed aluminum curtain-wall finish.

G. Entrance Door Systems: Comply with Section 084213 "Aluminum-Framed Entrances".

2.4 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: ASTM C509 or ASTM C864. Manufacturer's standard.

1. Color: Black.

C. Glazing Sealants: As recommended by manufacturer.

D. Structural Glazing Sealants: ASTM C1184, chemically curing silicone formulation that is compatible with system components with which it comes into contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in curtain-wall assembly indicated.

1. Color: As selected by Commissioner from manufacturer's full range of colors.

E. Weatherseal Sealants: ASTM C920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes into contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use.

1. Color: Match structural sealant.

2.5 SECURITY GLAZING CHANNEL

A. Security Glazing Channel: Aluminum channel provided by Curtain Wall manufacturer designed to capture security glazing sheet and integrate into curtain wall system.

1. Size to fit standard security glazing depth. Comply with Section 088853 - Security Glazing
2. Provide venting sufficient to create pressure equalized cavity and to minimize heat buildup and condensation. Perform testing as required to verify solar heat gain performance and condensation risk.
3. Provide filtered ventilation within cavity to inhibit dirt and dust. Perform long term testing to assure filtration is adequate to eliminate dirt buildup.
4. Engineer security glazing channel and connections to glazing system to withstand self-weight, windload and other performance requirements of Glazing system.

2.6 MATERIALS

A. Sheet and Plate: ASTM B209.

B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.

C. Structural Profiles: ASTM B308/B308M.

D. Steel Reinforcement:

1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

E. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

2.7 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials, min 0.625" thickness.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Provisions for safety railings mounted on interior face of mullions.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
8. Components curved to indicated radii.

D. Fabricate components to resist water penetration as follows:

1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.

E. Curtain-Wall Framing: Fabricate components for assembly using manufacturer's standard assembly method.

F. Factory-Assembled Frame Units:

1. Rigidly secure nonmovement joints.
2. Prepare surfaces that are in contact with structural sealant in accordance with sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
3. Seal joints watertight unless otherwise indicated.
4. Install glazing to comply with requirements in Section 088000 "Glazing."
5. Install structural glazing.

    a. Set glazing into framing in accordance with sealant manufacturer and framing manufacturer's written instructions and standard practice. Use a spacer or backer as recommended by manufacturer.
    b. Set glazing with proper orientation so that coatings face exterior or interior as specified.
    c. Apply structural silicone sealant to completely fill cavity, in accordance with sealant manufacturers written instructions with the framing and glazing in a fully supported position.
    d. Brace or stiffen framing and glazing in such a manner to prevent undue stresses on the glass edge seal and structural joints or movement of the glazing, until sealant is fully cured in accordance with manufacturer's recommendations.
    e. After structural sealant has completely cured, insert backer rod between lites of glass as recommended by sealant manufacturer.
    f. Install weatherseal sealant to completely fill cavity, in accordance with sealant manufacturer's written instructions, to produce weatherproof joints.
    g. Clean and protect glass as indicated in Section 088000 "Glazing."
    h. Retain bracing or stiffening until erected to prevent racking of units during transportation and erection.

G. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.9 ALUMINUM FINISHES

A. For all exposed interior surfaces: Baked-Enamel or Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color and Gloss: As selected by Commissioner from manufacturer's full range.

B. For all exposed exterior surfaces: Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.

1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
2. Color and Gloss: As selected by Commissioner from manufacturer's full range.

2.10 SOURCE QUALITY CONTROL

A. Structural Sealant: Perform quality-control procedures complying with ASTM C1401 recommendations, including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions.

B. Do not install damaged components.

C. Fit joints to produce hairline joints free of burrs and distortion.

D. Rigidly secure nonmovement joints.

E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

F. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.

G. Seal joints watertight unless otherwise indicated.

H. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

I. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

J. Install components plumb and true in alignment with established lines and grades.

3.4 INSTALLATION OF OPERABLE UNITS

A. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

3.5 INSTALLATION OF GLAZING

A. Install glazing as specified in Section 088000 "Glazing."

3.6 INSTALLATION OF STRUCTURAL GLAZING

A. Prepare surfaces that will contact structural sealant in accordance with sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

B. Set glazing into framing in accordance with sealant manufacturer's and framing manufacturer's written instructions and standard practice. Use a spacer or backer as recommended by manufacturer.

C. Set glazing with proper orientation, so that coatings face exterior or interior as specified.

D. Hold glazing in place using temporary retainers of type and spacing recommended by manufacturer, until structural sealant joint has cured.

E. Apply structural sealant to completely fill cavity, in accordance with sealant manufacturer's and framing manufacturer's written instructions and in compliance with New York City Building Code.

F. Apply structural sealant at temperatures indicated by sealant manufacturer for type of sealant.

G. Allow structural sealant to cure in accordance with manufacturer's recommendations.

H. Clean and protect glass as indicated in Section 088000 "Glazing."

3.7 INSTALLATION OF WEATHERSEAL SEALANT

A. After structural sealant has completely cured, remove temporary retainers and insert backer rod between lites of glass, as recommended by sealant manufacturer.

B. Install weatherseal sealant to completely fill cavity, in accordance with sealant manufacturer's written instructions, to produce weatherproof joints.

3.8 ERECTION TOLERANCES

A. Install glazed aluminum curtain walls to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:

a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.

4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Test Area: Perform tests on one bay at least 30 feet, by one story.

C. Field Quality-Control Testing: Perform the following test on representative areas of glazed aluminum curtain walls.

1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Commissioner must be tested in accordance with AAMA 501.2 and must not evidence water penetration.

a. Perform a minimum of three tests in areas as directed by Commissioner.
b. Perform tests in each test area as directed by Commissioner. Perform at least three tests, prior to 10, 35, and 70 percent completion.

D. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.10 ADJUSTING CLEANING AND PROTECTION

A. Adjust operating sashes and ventilators, screens, hardware, operators, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances

C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

E. Protect window/door surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations

END OF SECTION 084413

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Mechanical and electrified door hardware.
2. Electronic access control system components.

B. Related Requirements:

1. Section 081113 "Hollow Metal Doors and Frames" for astragals provided as part of labeled fire-rated assemblies and for door silencers provided as part of hollow-metal frames.
2. Section 084213 "Aluminum-Framed Entrances" for entrance door hardware, except cylinders.
3. Section 102240 "Glazed Interior Wall and Door Assemblies."
4. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
5. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system

1.3 COORDINATION

A. Floor-Recessed Door Hardware: Coordinate layout and installation with floor construction.

1. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Commissioner.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Conference participants must include Installer's Architectural Hardware Consultant.

B. Keying Conference, when required by Commissioner: Conduct conference at Project site.

1. Conference participants must include Installer's Architectural Hardware Consultant.
2. Incorporate conference decisions into keying schedule after reviewing door hardware keying system, including, but not limited to, the following:

a. Flow of traffic and degree of security required.
b. Preliminary key system schematic diagram.
c. Requirements for key control system.
d. Requirements for access control.
e. Address for delivery of keys.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data Submittals: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For electrified door hardware.

1. Include diagrams for power, signal, and control wiring.
2. Include details of interface of electrified door hardware and building safety and security systems.

C. Samples: For each exposed product in each finish specified, in manufacturer's standard size.

1. Tag Samples with full product description to coordinate Samples with door hardware schedule.

D. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Submittal Sequence: Submit door hardware schedule after or concurrent with submissions of product data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
3. Content: Include the following information:

a. Identification number, location, hand, fire rating, size, and material of each door and frame.
b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.

c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
e. Fastenings and other installation information.
f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
g. Mounting locations for door hardware.
h. List of related door devices specified in other Sections for each door and frame.

E. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Commissioner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

F. Tools and Instructions: Furnish a complete set of specialized tools and instructions for continued adjustment, removal and replacement of door hardware.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of electrified door hardware.

1. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.

C. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals.

B. Schedules: Final door hardware and keying schedule.

C. Furnish complete set of special tools required for adjustment of hardware, including changing of cylinders.

1. Turn over unused materials to Commissioner.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: Supplier of products and an employer of workers properly trained by product manufacturers and of a DHI certified Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, and Commissioner about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedule.

3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lockup for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to City of New York.

D. Deliver keys and permanent cores to City of New York. Coordinate secure delivery method with Commissioner.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of door hardware from single manufacturer.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency are acceptable.

B. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Commissioner's approval.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested in accordance with UL 1784 and installed in compliance with NFPA 105.

1. Air-Leakage Rate: Maximum air leakage of 0.3 cfm per sq. ft. at the tested pressure differential of 0.3 inch wg of water.

C. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

E. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1-2009.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
2. Comply with the following maximum opening-force requirements:

   a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
   b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 HINGES

A. Hinges: ANSI/BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

1. Basis of Design Product: Subject to compliance with requirements, provide Ives; 5BB series or comparable product by one of the following:

   a. Best; FBB series.
   b. Hager Companies; BB1191/1279 series.
   c. Or approved equal.

2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch thick doors, up to and including 36 inches wide:

   a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches high.
   b. Interior: Standard weight, steel, 4-1/2 inches (high

4. 1-3/4 inch thick doors over 36 inches wide:

   a. Exterior: Heavy weight, bronze/stainless steel, 5 inches high.
   b. Interior: Heavy weight, steel, 5 inches high.

5. 2 inches or thicker doors:

   a. Exterior: Heavy weight, bronze or stainless steel, 5 inches high.
   b. Interior: Heavy weight, steel, 5 inches high.

6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches or less in height, and one additional hinge for each 30 inches of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:

a. Steel Hinges: Steel pins
b. Non-Ferrous Hinges: Stainless steel pins
c. Out-Swinging Exterior Doors: Non-removable pins
d. Out-Swinging Interior Lockable Doors: Non-removable pins
e. Interior Non-lockable Doors: Non-rising pins

9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.4 CONTINUOUS HINGES

A. Continuous, Gear-Type Hinges: ANSI/BHMA A156.26, Grade 1; minimum 0.120-inch- thick, 6063-T6 extruded-aluminum, pinless, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating nylon bearings. Minimum overall width of 4 inches; fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.

1. Basis of Design Product: Subject to compliance with requirements, provide products by Ives, or comparable products by one of the following:

   a. Select Products Limited.
   b. Roton.
   c. Or approved equal.

2. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
3. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency deemed acceptable by NYC BC 2022.
4. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
5. Provide hinges 1 inch shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.5 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Mortise Locks: Minimum 3/4-inch latchbolt throw.
2. Deadbolts: Minimum bolt throw.

C. Lock Backset: 2-3/4 inches unless otherwise indicated.

D. Lock Trim:

1. Description: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
2. Levers: Forged Cast.

    a. Lever Design: 02A.

3. Escutcheons (Roses): Wrought.
4. Dummy Trim: Match lever lock trim and escutcheons.

E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

F. Mortise Locks: ANSI/BHMA A156.13, ; stamped steel case with steel or brass parts; Series 1000, UL Listed for 3-hour fire doors.

1. Basis of Design Product: Subject to compliance with requirements, provide Schlage L9000 series or one of the following comparable products:

    a. BEST Access Solutions, Inc.; dormakaba USA Inc; 45H series.
    b. Falcon; MA Series.
    c. SARGENT Manufacturing Company; ASSA ABLOY; 8200 series.
    d. Or approved equal.

2. Indicators: Where required, provide indicator window measuring a minimum 2-3/5-inch x 3/5 inch with 180-degree visibility. Provide messages color-coded using ANSI Z535 Safety Red with full text and/or symbols, as scheduled, for easy visibility. When applicable allows for lock status indication on both sides of the door.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to Keying article.
5. Provide locks with standard 2-3/4 inches backset with full 3/4 inch throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch throw, constructed of stainless steel.
6. Provide motor based electrified lockset that comply with the following requirements:

    a. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
    b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case.
    c. Low maximum current draw – maximum 0.4 amps to allow for multiple locks on a single power supply.
    d. Low holding current – maximum 0.01 amps to produce minimal heat, eliminate “hot levers” in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
    e. Connections – provide quick-connect Molex system standard.

7. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.

    a. Lever Design: 02A.

2.6 MANUAL FLUSH BOLTS

A. Manual Flush Bolts: ANSI/BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.

1. Basis of Design Product: Subject to compliance with requirements, provide products by Ives, or comparable products by one of the following:

    a. Adams Rite Manufacturing Company, an ASSA ABLOY Group company.
    b. Burns Manufacturing Incorporated.
    c. Trimco.
    d. Or approved equal.

2.7 AUTOMATIC AND SELF-LATCHING FLUSH BOLTS

A. Automatic Flush Bolts: ANSI/BHMA A156.3, Type 25; minimum 3/4-inch throw; with dust-proof strikes; designed for mortising into door edge. Include wear plates.

1. Basis of Design Product: Subject to compliance with requirements, provide products by Ives, or comparable products by one of the following:

    a. Burns Manufacturing Incorporated.
    b. Rutherford Controls Int'l. (RCI); dormakaba Group.
    c. Trimco.
    d. Or approved equal.

B. Self-Latching Flush Bolts: ANSI/BHMA A156.3, Type 27; minimum 3/4-inch throw; with dust-proof strikes; designed for mortising into door edge. Include wear plates.

1. Basis of Design Product: Subject to compliance with requirements, provide products by Ives, or comparable products by one of the following:

    a. Burns Manufacturing Incorporated.
    b. Rutherford Controls Int'l. (RCI); dormakaba Group.
    c. Trimco.
    d. Or approved equal.

2.8 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: ANSI/BHMA A156.3 and UL listed for panic exit or fire exit hardware required by project application.

1. Basis of Design Product: Subject to compliance with requirements, provide Von Duprin 98/35A series, or comparable products by of the following:

    a. Falcon; 24/25 series.
    b. Precision Hardware, Inc.; dormakaba Group; APEX 2000 series.
    c. SARGENT Manufacturing Company; ASSA ABLOY; 19-43-GL-80 series.
    d. Or approved equal.

2. Cylinders: Refer to article 2.11.
3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer's approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, and in conformance with NYC BC 2022, as approved by Commissioner.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches x 3 inches steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.9 ELECTRIC POWER TRANSFER

A. Basis of Design Products: Subject to compliance with requirements, provide Von Duprin; EPT-10 or comparable product by one of the following:

    1. ABH Manufacturing Inc.; PT1000.
    2. Assa Abloy; Securitron CEPT-10.
    3. Or approved equal

B. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.

C. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.10 POWER SUPPLIES

A. Basis of Design Products: Subject to compliance with requirements, provide Schlage/Von Duprin; PS900 Series or comparable product by one of the following:

1. Precision Hardware, Inc.; dormakaba Group; ELR series.
2. SARGENT Manufacturing Company; ASSA ABLOY; 3500 series.
3. Or approved equal.

B. Provide power supplies approved by manufacturer of supplied electrified hardware.

C. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Commissioner.

D. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.

E. Provide power supplies with the following features:

1. 12/24 VDC Output, field selectable.
2. Class 2 Rated power limited output.
3. Universal 120-240 VAC input.
4. Low voltage DC, regulated and filtered.
5. Polarized connector for distribution boards.
6. Fused primary input.
7. AC input and DC output monitoring circuit w/LED indicators.
8. Cover mounted AC Input indication.
9. Tested and certified to meet UL294.
10. NEMA 1 enclosure.
11. Hinged cover w/lock down screws.
12. High voltage protective cover.

2.11 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

1. Basis of Design Product: Subject to compliance with requirements, provide Schlage Everest 29 T or comparable products by one of the following:

a. BEST Access Solutions, Inc.; dormakaba USA Inc.; Cormax.
b. Corbin Russwin, Inc.; an ASSA ABLOY Group company; Patented and Restricted Keyway.
c. Medeco Security Locks; an ASSA ABLOY Group company; Keymark.
d. Or approved equal.

B. Standard Lock Cylinders: ANSI/BHMA A156.5, Grade 1 permanent cores; face finished to match lockset.

1. Core Type: Interchangeable.

2. Cylinder face finished to match lockset, manufacturer's series as indicated. Refer to article 2.12 Keying.
3. Nickel silver bottom pins.

C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.12 KEYING

A. Keying System: Factory registered, complying with guidelines in ANSI/BHMA A156.28, appendix. Provide one extra key blank for each lock. Incorporate decisions made in keying conference.

1. Construction Keying, Replaceable Construction Cores.

a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.

1) 3 construction control keys
2) 12 construction change (day) keys.

b. Commissioner will replace temporary construction cores with permanent cores.

2. Permanent Master Key System: Change keys and a master key operate cylinders as directed by Commissioner.

a. Forward permanent cylinders/cores to Commissioner, separately from keys, by means as directed by Commissioner.
b. Forward bitting list and keys separately from cylinders, by means as directed by Commissioner.
c. Quantity: Furnish in the following quantities unless otherwise directed.

1) Permanent Control Keys: 3.
2) Master Keys: 6.
3) Change (Day) Keys: 3 per cylinder/core that is keyed differently.
4) Key Blanks: Quantity as determined in the keying meeting.

d. Provide three cylinder change keys and five master keys.

B. Keys: Nickel silver.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: Information to be provided by Commissioner along with the "PATENTED" or patent number to enforce the patent protection.

2.13 KEY CONTROL SYSTEM

A. Key Control Cabinet: ANSI/BHMA A156.28; metal cabinet with baked-enamel finish, containing key-holding hooks, labels, two sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.

1. Basis of Design Product: Subject to compliance with requirements, provide TelKee; Oasis International or comparable product by one of the following:

   a. HPC, a Hudson Lock Company.
   b. Lund Equipment Co., Inc.
   c. Or approved equal.

2. Wall-Mounted Cabinet: Grade 1 cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.

2.14 OPERATING TRIM

A. Operating Trim: ANSI/BHMA A156.6; stainless steel unless otherwise indicated.

1. Basis of Design Product: Subject to compliance with requirements, provide products by Ives or comparable product by one of the following:

   a. Burns Manufacturing Incorporated.
   b. Rockwood Manufacturing Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY.
   c. Trimco.
   d. Or approved equal.

2.15 ACCESSORIES FOR PAIRS OF DOORS

A. Coordinators: ANSI/BHMA A156.3; consisting of active-leaf, hold-open lever, and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release; and with internal override.

1. Basis of Design Product: Subject to compliance with requirements, provide products by Ives or comparable product by one of the following:

   a. Burns Manufacturing Incorporated.
   b. Rockwood Manufacturing Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY.
   c. Trimco.
   d. Or approved equal.

2. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
3. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes, or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as required.

B. Carry-Open Bars: ANSI/BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.

C. Astragals: ANSI/BHMA A156.22.

2.16 SURFACE CLOSERS

A. Surface Closers: ANSI/BHMA A156.4, Grade 1; rack-and-pinion hydraulic type with cast aluminum cylinder, adjustable sweep, and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Basis of Design Product: Subject to compliance with requirements, provide LCN 4050A series or comparable product by one of the following:

   a. Falcon SC70A series.
   b. Norton Door Controls; ASSA ABLOY; 7500 series.
   c. Or approved equal.

2. Closer Body: 1-1/2-inch diameter with 11/16-inch diameter heat-treated pinion journal and full complement bearings.
3. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and all weather requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
4. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
5. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
6. Pressure Relief Valve (PRV) Technology: Not permitted.
7. Provide stick on templates, special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.17 CLOSER HOLDER RELEASE DEVICES

A. Closer Holder Release Devices: ANSI/BHMA A156.15, Grade 1; closer connected with separate or integral releasing and fire- or smoke-detecting devices. Door must become self-closing on interruption of signal to release device. Automatic release is activated by smoke detection system loss of power.

1. Basis of Design Product: Subject to compliance with requirements, provide products by Glynn-Johnson or comparable product by one of the following:

   a. Rixson Specialty Door Controls; ASSA ABLOY.
   b. SARGENT Manufacturing Company; ASSA ABLOY.
   c. Or approved equal.

2. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.18 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: ANSI/BHMA A156.16.

1. Basis of Design Product: Subject to compliance with requirements, provide products by Ives or comparable product by one of the following:

    a. Burns Manufacturing Incorporated.
    b. Trimco.
    c. Or approved equal.

2.19 DOOR GASKETING

A. Door Gasketing: ANSI/BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Basis of Design Product: Subject to compliance with requirements, provide products by Zero International; or comparable product by one of the following:

    a. National Guard Products, Inc.
    b. Pemko Manufacturing Company Inc.; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY.
    c. Reese Enterprises, Inc.
    d. Or approved equal.

B. Provide thresholds, weather-stripping, and gasketing systems as required and per drawings. Match finish of other items.

C. Maximum Air Leakage when required by project application: When tested in accordance with ASTM E283/E283M with tested pressure differential of 0.3 inch wg, as follows:

1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. of door opening.
2. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.
3. Gasketing on Double Doors: 0.50 cfm per ft. of door opening.

D. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

E. Size thresholds 1/2 inch high by 5 inches wide by door width unless otherwise indicated in the hardware sets or detailed in the drawings.

2.20 THRESHOLDS

A. Thresholds: ANSI/BHMA A156.21; fabricated to full width of opening indicated.

1. Basis of Design Product: Subject to compliance with requirements, provide products by Zero International or comparable products by one of the following:

    a. National Guard Products, Inc.
    b. Reese Enterprises, Inc.
    c. Or approved equal.

2. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
3. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
4. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
5. Size thresholds 1/2 inch high by 5 inches wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.21 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: ANSI/BHMA A156.6; fabricated from 0.050-inch- thick ; with manufacturer's standard machine or self-tapping screw fasteners.

1. Basis of Design Product: Subject to compliance with requirements, provide products by Ives, or comparable products by one of the following:

   a. Burns Manufacturing Incorporated.
   b. Rockwood Manufacturing Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY.
   c. Trimco.
   d. Or approved equal.

2.22 AUXILIARY DOOR HARDWARE

A. Auxiliary Door Hardware: ANSI/BHMA A156.16.

B. Silencers except where gasketing is used:

1. Use one silencer per 30 inches of height on each single frame and two for each pair frame.
   a. Basis of Design Products: Subject to compliance with requirements, provide products by Ives, or comparable products by one of the following:

      1) Burns Manufacturing Incorporated.
      2) Rockwood Manufacturing Company; ASSA ABLOY Accessories and Door Controls Group, Inc.; ASSA ABLOY.
      3) Or approved equal.

C. Silencers except where gasketing is used:

1. Type: "Push-in" silencers for hollow metal frames.
2. Use one silencer per 30 inches of height on each single frame and two for each pair frame.

D. Coat Hooks: As indicated on drawings or selected by Commissioner.

2.23 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Commissioner.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and ANSI/BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended; however, aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Fire-Rated Applications:

a. Steel Through Bolts: For the following unless door blocking is provided:

1) Surface hinges to doors.
2) Closers to doors and frames.
3) Surface-mounted exit devices.

3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.24 FINISHES

A. Provide finishes complying with ANSI/BHMA A156.18 and as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Finishes: BHMA 626/652 (US26D);except as follows:

1. Hinges at Exterior Doors: BHMA 630 (US32D).

2. Aluminum Geared Continuous Hinges: BHMA 628 (US28).
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D).
4. Protection Plates: BHMA 630 (US32D).
5. Overhead Stops and Holders: BHMA 630 (US32D).
6. Door Closers: Powder Coat to Match.
7. Wall Stops: BHMA 630 (US32D).
8. Latch Protectors: BHMA 630 (US32D).
9. Weatherstripping: Clear Anodized Aluminum.
10. Thresholds: Mill Finish Aluminum.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames in accordance with ANSI/SDI A250.6.

3.4 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Installation Guide for Doors and Hardware: DHI TDH-007.

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Commissioner.
2. Furnish permanent cores to City of New York for installation.

E. Key Control System:

1. Key Control Cabinet: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
2. Key Control System Software: Set up multiple-index system based on final keying schedule.

F. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Commissioner.

G. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch perimeter gasketing to install other surface-applied hardware.

I. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

J. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of the Building Code of the City of New York.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Instruct City of New York's personnel to adjust and operate door hardware.

3.8 DOOR HARDWARE SCHEDULE

A. Hardware schedule in coordination with drawings is intended to specify door hardware sets (Hardware Group No.). for project.

1. Review project conditions and other Contract Documents to verify the suitability of the hardware specified.
2. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the Commissioner .Provide items not included in a hardware set with the appropriate hardware required for proper application.
3. Note all manufacturers listed below are Basis of Design only. Refer to Part 2 for additional manufacturers and approved equals.

B. Abbreviations:

1. BYO By Others
2. GLY Glynn-Johnson Corp
3. IVE H.B. Ives
4. LCN LCN Commercial Division
5. MIS Misc - Out-Sourced Items
6. SCE Schlage Electronic Security
7. SCH Schlage Lock Company
8. SIW SIMONSWERK North America, Inc.
9. TYD Tydix Products
10. VON Von Duprin
11. WIK Wikk Industries, Inc.
12. ZER Zero International Inc

C. Hardware Groups:

Hardware Group No. CR01
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	CLASSROOM LOCK	L9070T LATA	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	SET	GASKETING	870AA-S	AA	ZER
1	EA	DOOR BOTTOM	355AA	AA	ZER

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	THRESHOLD	164A-223	A	ZER
1	EA	MOUNTING BRACKET	870SPB		ZER

Hardware Group No. CR02:
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5 NRP	652	IVE
1	EA	MANUAL FLUSH BOLT	FB458 PROVIDE TOP ROD LENGTH AS REQUIRED DUE TO DOOR HEIGHT	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	CLASSROOM LOCK	L9070T LATA	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
2	EA	OH STOP	100S	630	GLY
2	EA	KICK PLATE	8400 10" x1" LDW B-CS	630	IVE
2	EA	SILENCER	SR64 (OMIT @ RATED OPENINGS)	GRY	IVE

Hardware Group No. CR03
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5 NRP	652	IVE
1	EA	CLASSROOM LOCK	L9070T LATA	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A EDA	689	LCN
1	EA	MOP PLATE	8400 4" B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA (PROVIDE @ RATED OPENINGS)	BK	ZER
3	EA	SILENCER	SR64 (OMIT @ RATED OPENINGS)	GRY	IVE

Hardware Group No. CR04
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5 NRP	652	IVE
1	EA	CLASSROOM LOCK	L9070T LATA	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA (PROVIDE @ RATED OPENINGS)	BK	ZER
3	EA	SILENCER	SR64 (OMIT @ RATED OPENINGS)	GRY	IVE

Hardware Group No. CR05
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1 4.5 x 4.5 NRP	652	IVE
1	EA	CLASSROOM LOCK	L9070T LATA	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A EDA	689	LCN
1	EA	FLOOR STOP	FS410	626	IVE
1	SET	SEALS	BY FRAME MANUFACTURER		MIS

Hardware Group No. CR06
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1 4.5 x 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070T LATA	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A RW/PA	689	LCN
1	EA	FLOOR STOP	FS410	626	IVE
1	SET	SEALS	BY FRAME MANUFACTURER		MIS

Hardware Group No. ED01
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5 NRP	652	IVE
1	EA	FIRE EXIT HARDWARE	98-L-NL-F-LAT	626	VON
1	EA	CYLINDER	AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA (PROVIDE @ RATED OPENINGS)	BK	ZER
3	EA	SILENCER	SR64 (OMIT @ RATED OPENINGS)	GRY	IVE

Hardware Group No. ED02
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5 NRP	652	IVE
1	EA	FIRE EXIT HARDWARE	98-L-NL-F-LAT	626	VON
1	EA	CYLINDER	AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	GASKETING	488SBK PSA (PROVIDE @ RATED OPENINGS)	BK	ZER
3	EA	SILENCER	SR64 (OMIT @ RATED OPENINGS)	GRY	IVE

Hardware Group No. ED03
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HINGE	5BB1HW 4.5 x 4.5 NRP	652	IVE
1	EA	PANIC HARDWARE	9827-EO-LBR	626	VON
1	EA	PANIC HARDWARE	9827-L-LBR-LAT	626	VON
1	EA	CYLINDER	AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
2	EA	SURFACE CLOSER	4050A SCUSH	689	LCN
1	EA	BALANCE OF HARDWARE	BY DOOR MANUFACTURER		MIS

Hardware Group No. ED04
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
2	EA	PANIC HARDWARE	9827-L-LBR-LAT	626	VON
2	EA	CYLINDER	AS REQUIRED	626	SCH
2	EA	RIM CYLINDER	20-057 ICX	626	SCH
2	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
2	EA	SURFACE CLOSER	4050A EDA	689	LCN
2	EA	FLOOR STOP	FS410	626	IVE
1	SET	SEALS	BY FRAME MANUFACTURER		MIS

Hardware Group No. ED05
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	PRE-HUNG HINGES	BY DOOR MANUFACTURER	652	MIS
1	EA	PANIC HARDWARE	9827-EO-LBR	626	VON
1	EA	PANIC HARDWARE	9827-L-LBR-LAT	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
2	EA	SURFACE CLOSER	4050A SCUSH	689	LCN
1	EA	BALANCE OF HARDWARE	BY DOOR MANUFACTURER		MIS

Hardware Group No. EL01
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	EL MORTISE LOCK	L9092TEL LATA RX CON 12/24 VDC	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A RW/PA	689	LCN
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	GASKETING	328AA-S	AA	ZER
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	566A-223	A	ZER
1	EA	WIRE HARNESS	CON-LENGTH TO SUIT		SCH
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	NOTE	CARD READER(S) - WORK OF DIVISION 28		
1	EA	NOTE	DOOR CONTACT(S) - WORK OF DIVISION 28		
1	EA	NOTE	POWER SUPPLY - WORK OF DIVISION 28		

Hardware Group No. EL02
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5 NRP	630	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HARDWARE	LD-RX-LC-98-L-M996-LAT-FSE-CON	626	VON
1	EA	CYLINDER	AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	DOOR SWEEP	328AA	AA	ZER
1	SET	GASKETING	328AA-S	AA	ZER
1	EA	THRESHOLD	566A-223	A	ZER
1	EA	MOUNTING BRACKET	328SPB		ZER
1	EA	WIRE HARNESS	CON-LENGTH TO SUIT		SCH
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	NOTE	CARD READER(S) - WORK OF DIVISION 28		
1	EA	NOTE	DOOR CONTACT(S) - WORK OF DIVISION 28		
1	EA	NOTE	POWER SUPPLY - WORK OF DIVISION 28		

Hardware Group No. EL03
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	PRE-HUNG HINGES	BY DOOR MANUFACTURER	652	MIS
2	EA	POWER TRANSFER	EPT10 CON	689	VON

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-3547A-EO-CON 24 VDC	626	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-3547A-TL-OP-376T-CON 24 VDC	626	VON
1	EA	CYLINDER	AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
2	EA	LONG DOOR PULL	9264F O MOUNTING HEIGHT AS PER DOOR ELEVATION	630	IVE
1	EA	SURFACE CLOSER	4050A SCUSH	689	LCN
1	EA	AUTO OPERATOR	9542 HDR2 MS AS REQ (120/240 VAC)	ANCLR	LCN
1	EA	PA MOUNTING PLATE	4050A-18PA SRT	689	LCN
1	EA	CUSH SHOE SUPPORT	4050A-30 SRT	689	LCN
1	EA	BLADE STOP SPACER	4050A-61 SRT	689	LCN
1	EA	ACTUATOR, TOUCH	8310-853T	630	LCN
1	EA	ACTUATOR, TOUCH	8310-855	630	LCN
2	EA	MOUNT BOX	8310-867F		LCN
1	EA	CUSTOM BOLLARD	BPS-SM PREP FOR ACTUATOR	630	WIK
2	EA	WIRE HARNESS	CON-LENGTH TO SUIT		SCH
2	EA	WIRE HARNESS	CON-6W		SCH
1	EA	INTERCOM	BY SECURITY		BYO
1	EA	POWER SUPPLY	PS902 900-4RL 120/240 VAC	LGR	SCE
1	EA	NOTE	CARD READER(S) - WORK OF DIVISION 28		
2	EA	NOTE	DOOR CONTACT(S) - WORK OF DIVISION 28		
1	EA	NOTE	SEALS BY DOOR MANUFACTURER - SECTION 084113		

1. Operational Description:

   a. Doors normally closed and locked.
   b. Entry by valid credential at card reader which signals the latch of exit device to retract and allow entry. Door may also be opened manually via use of key in outside control.
   c. Door may also be used as push/pull provided the doors are electrically dogged down.
   d. Free egress at all times via panic device.
   e. Panic device has rx switch which will signal access control system of a valid release.
   f. Exit device is fail-secure upon loss of power doors will remain locked.

Hardware Group No. EL04
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5 NRP	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-LC-98-L-F-M996-LAT-FS-CON	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA (PROVIDE @ RATED OPENINGS)	BK	ZER
3	EA	SILENCER	SR64 (OMIT @ RATED OPENINGS)	GRY	IVE
1	EA	WIRE HARNESS	CON-LENGTH TO SUIT		SCH
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	NOTE	CARD READER(S) - WORK OF DIVISION 28		
1	EA	NOTE	DOOR CONTACT(S) - WORK OF DIVISION 28		
1	EA	NOTE	POWER SUPPLY - WORK OF DIVISION 28		

Hardware Group No. EL05
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	EU MORTISE LOCK	L9092TEU LATA RX CON 12/24 VDC	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA (PROVIDE @ RATED OPENINGS)	BK	ZER
3	EA	SILENCER	SR64 (OMIT @ RATED OPENINGS)	GRY	IVE
1	EA	WIRE HARNESS	CON-LENGTH TO SUIT		SCH
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	NOTE	CARD READER(S) - WORK OF DIVISION 28		
1	EA	NOTE	DOOR CONTACT(S) - WORK OF DIVISION 28		
1	EA	NOTE	POWER SUPPLY - WORK OF DIVISION 28		

Hardware Group No. EL06
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	PRE-HUNG HINGES	BY DOOR MANUFACTURER	652	MIS
1	EA	PANIC HARDWARE	LD-98-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	ELECTRIC STRIKE	6300 FSE 12/24 VAC/VDC	630	VON
1	EA	LONG DOOR PULL	9264F O MOUNTING HEIGHT AS PER DOOR ELEVATION	630	IVE
1	EA	SURFACE CLOSER	4050A SCUSH	689	LCN
1	SET	GASKETING	328AA-S	AA	ZER
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	566A-223	A	ZER
1	EA	MOUNTING BRACKET	328SPB		ZER
1	EA	NOTE	CARD READER(S) - WORK OF DIVISION 28		
1	EA	NOTE	DOOR CONTACT(S) - WORK OF DIVISION 28		
1	EA	NOTE	POWER SUPPLY - WORK OF DIVISION 28		

Hardware Group No. EL07
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	PRE-HUNG HINGES	BY DOOR MANUFACTURER	652	MIS
2	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-3547A-EO-CON 24 VDC	626	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-3547A-TL-OP-376 T-CON 24 VDC	626	VON
1	EA	CYLINDER	AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
2	EA	LONG DOOR PULL	9264F O MOUNTING HEIGHT AS PER DOOR ELEVATION	630	IVE
2	EA	SURFACE CLOSER	4050A SCUSH	689	LCN
2	EA	PA MOUNTING PLATE	4050A-18PA SRT	689	LCN
2	EA	CUSH SHOE SUPPORT	4050A-30 SRT	689	LCN
2	EA	BLADE STOP SPACER	4050A-61 SRT	689	LCN
2	EA	WIRE HARNESS	CON-LENGTH TO SUIT		SCH
2	EA	WIRE HARNESS	CON-6W		SCH
1	EA	INTERCOM	BY SECURITY		BYO
1	EA	POWER SUPPLY	PS902 900-4RL 120/240 VAC	LGR	SCE
1	EA	NOTE	CARD READER(S) - WORK OF DIVISION 28		
2	EA	NOTE	DOOR CONTACT(S) - WORK OF DIVISION 28		
1	EA	NOTE	SEALS BY DOOR MANUFACTURER - SECTION 084113		

1. Operational Description
   a. Doors normally closed and locked.
   b. Entry by valid credential at card reader signals the latch of exit device to retract and allow entry.

c. Door may also be opened manually via use of key in outside control.
d. Door may also be used as push/pull provided the doors are electrically dogged down.
e. Free egress at all times via the panic device.
f. Panic device has rx switch which will signal access control system of a valid release.
g. Exit device is fail-secure upon loss of power doors will remain locked.

Hardware Group No. GA01
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	SPRING HINGE	3SP1 4.5 X 4.5	630	IVE
1	EA	STOREROOM LOCK	L9080T LATA	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	MIS
1	EA	CRASH STOP	CS115 25 1/2"	626	IVE

Hardware Group No. OF01
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5	652	IVE
1	EA	CORRIDOR LOCK W/ OUTSIDE INDICATOR	L9456T LATA L583-363 OS-LOC	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR64 (OMIT @ RATED OPENINGS)	GRY	IVE

Hardware Group No. OF02
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5 NRP	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T LATA 09-544	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA (PROVIDE @ RATED OPENINGS)	BK	ZER
3	EA	SILENCER	SR64 (OMIT @ RATED OPENINGS)	GRY	IVE

Hardware Group No. OF03
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1 4.5 x 4.5	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T LATA 09-544	626	SCH
1	EA	CYLINDER	AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	SURFACE CLOSER	4050A RW/PA	689	LCN
1	EA	FLOOR STOP	FS410	626	IVE
1	SET	SEALS	BY FRAME MANUFACTURER		MIS

Hardware Group No. PA01
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5	652	IVE
1	EA	PASSAGE SET	L9010 LATA	626	SCH
1	EA	SURFACE CLOSER	4050A RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	GASKETING	870AA-S	AA	ZER
1	EA	DOOR BOTTOM	355AA	AA	ZER
1	EA	THRESHOLD	164A-223	A	ZER

Hardware Group No. PA02
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5	652	IVE
1	EA	PASSAGE SET	L9010 LATA	626	SCH
1	EA	SURFACE CLOSER	4050A RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA (PROVIDE @ RATED OPENINGS)	BK	ZER

Hardware Group No. PA03
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5	652	IVE
1	EA	PASSAGE SET	L9010 LATA	626	SCH
1	EA	SURFACE CLOSER	4050A RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	SET	GASKETING	870AA-S	AA	ZER
1	EA	DOOR BOTTOM	355AA	AA	ZER

Hardware Group No. PP01
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	PRE-HUNG HINGES	BY DOOR MANUFACTURER	652	MIS
2	EA	DUMMY PUSH BAR	350	626	VON
2	EA	LONG DOOR PULL	9264F O MOUNTING HEIGHT AS PER DOOR ELEVATION	630	IVE
1	EA	SURFACE CLOSER	4050A SCUSH	689	LCN

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	AUTO OPERATOR	9542 HDR2 MS AS REQ (120/240 VAC)	ANCLR	LCN
1	EA	PA MOUNTING PLATE	4050A-18PA SRT	689	LCN
1	EA	CUSH SHOE SUPPORT	4050A-30 SRT	689	LCN
1	EA	BLADE STOP SPACER	4050A-61 SRT	689	LCN
1	EA	ACTUATOR, TOUCH	8310-853T	630	LCN
1	EA	MOUNT BOX	8310-867F		LCN
1	EA	CUSTOM BOLLARD	BPS-SM PREP FOR ACTUATOR	630	WIK
1	EA	NOTE	SEALS BY DOOR MANUFACTURER - SECTION 084113		

Hardware Group No. PR01
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5	652	IVE
1	EA	PRIVACY LOCK W/ OUTSIDE INDICATOR	L9040 LATA L583-363 OS-OCC	626	SCH
1	EA	SURFACE CLOSER	4050A RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	MOP PLATE	8400 4" B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA (PROVIDE @ RATED OPENINGS)	BK	ZER
1	EA	COAT AND HAT HOOK	582	626	IVE
3	EA	SILENCER	SR64 (OMIT @ RATED OPENINGS)	GRY	IVE

Hardware Group No. RL01
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	INVISIBLE HINGE	TE540 A8 3D x TE540 3D A8 SZ RECEIVE	626	SIW
2	EA	ROLLER LATCH	RL1152	626	IVE
2	EA	FLUSH PULL	962	626	IVE
2	EA	EDGE PULL	SRO	626	TYD
2	EA	OH STOP	100S	630	GLY

Hardware Group No. ST01
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	L9080T LATA	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	GASKETING	488SBK PSA (PROVIDE @ RATED OPENINGS)	BK	ZER
3	EA	SILENCER	SR64 (OMIT @ RATED OPENINGS)	GRY	IVE

Hardware Group No. ST02
Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HINGE	5BB1HW 4.5 x 4.5 NRP	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458 PROVIDE TOP ROD LENGTH AS REQUIRED DUE TO DOOR HEIGHT	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080T LATA	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4050A EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	SILENCER	SR64 (OMIT @ RATED OPENINGS)	GRY	IVE

Hardware Group No. ST03
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080T LATA	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA (PROVIDE @ RATED OPENINGS)	BK	ZER
3	EA	SILENCER	SR64 (OMIT @ RATED OPENINGS)	GRY	IVE

Hardware Group No. ST04
Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 x 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	L9080T LATA	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	SURFACE CLOSER	4050A EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488SBK PSA (PROVIDE @ RATED OPENINGS)	BK	ZER

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	SILENCER	SR64 (OMIT @ RATED OPENINGS)	GRY	IVE

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Glass products.
2. Laminated glass.
3. Insulating glass.
4. Glazing sealants.
5. Miscellaneous glazing materials.

B. Related Requirements:

1. Section 084213 - Aluminum-Framed Entrances
2. Section 084413 - Glazed Aluminum Curtain Walls
3. Section 088853 - Security Glazing

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.6 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

C. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

1. Coated glass.
2. Laminated glass.
3. Insulating glass.
4. Spandrel glass.

D. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of adjoining framing system.

E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.8 INFORMATIONAL SUBMITTALS

A. Product Certificates: For glass.

B. Product Test Reports: For fabricated glass and glazing sealants, for tests performed by a qualified testing agency.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

C. Preconstruction adhesion and compatibility test report.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/1, and who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

E. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Install glazing in mockups specified in Section 084213 "Aluminum-Framed Entrances" and Section 084413 "Glazed Aluminum Curtain Walls" to match glazing systems required for Project, including glazing methods.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.12 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.13 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

D. Manufacturer's Special Warranty for Heat-Soaked Tempered Glass: Manufacturer agrees to replace heat-soaked tempered glass units that spontaneously break due to nickel sulfide (NiS) inclusions at a rate exceeding 0.3 percent within specified warranty period. Coverage for any other cause is excluded.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glass: Obtain glass from single source from single manufacturer.

B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems must withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions to design glazing.

C. Structural Performance: Glazing must withstand the following design loads within limits and under conditions indicated, and determined in accordance with the IBC and ASTM E1300:

1. Design Wind Pressures: Determine design wind pressures applicable to Project in accordance with ASCE/SEI 7, based on heights above grade indicated on Drawings.

   a. Wind Design Data: As indicated on Drawings.
   b. Basic Wind Speed: As indicated in Windload Diagram.
   c. Importance Factor: 1.0.
   d. Exposure Category B.

2. Design Snow Loads: As indicated on Drawings.
3. Probability of Breakage for Sloped Glazing: For glass sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
4. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
5. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.
6. Maximum edge deflection of L/175 or 3/4" whichever is less.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F.
5. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
6. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of manufacturer. Label must indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass. . Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AGC Glass Company North America, Inc.
b. Cardinal Glass Industries.
c. Guardian Glass.
d. Pilkington North America.
e. Vitro Architectural Glass.
f. Saint Gobain Glass
g. Or approved equal.

B. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

C. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

D. Reflective- and Low-E-Coated Vision Glass: ASTM C1376.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cardinal Glass Industries.
b. Guardian Glass.
c. Pilkington North America.
d. Viracon, Inc.
e. Vitro Architectural Glass.
f. Saint Gobain Glass
g. Or approved equal.

2.5 LAMINATED GLASS

A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Eastman Chemical Company.
b. Kuraray America, Inc.
c. Dupont
d. Or approved equal.

2. Construction: Laminate glass with polyvinyl butyral interlayer or ionoplast interlayer to comply with interlayer manufacturer's written instructions.
3. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
4. Interlayer Color: Clear unless otherwise indicated.

2.6 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Perimeter Spacer: Manufacturer's standard low conductivity "warm edge" spacer.

3. Basis of Design Product: Subject to compliance with requirements, provide Guardian Glass; insulated glass units or comparable product by one of the following:

1) Technoform.
2) Saint Gobain Glass
3) Vitro Architectural Glass
4) Or approved equal.

4. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.7 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Neutral-Curing Silicone Glazing Sealant, Class 50: Complying with ASTM C920, Type S, Grade NS, Use NT.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks:

1. EPDM with Shore A durometer hardness of 85, plus or minus 5.
2. Type recommended in writing by sealant or glass manufacturer.

D. Spacers:

1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
2. Type recommended in writing by sealant or glass manufacturer.

E. Edge Blocks:

1. EPDM with Shore A durometer hardness per manufacturer's written instructions.
2. Type recommended in writing by sealant or glass manufacturer.

F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.9 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.4 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch- minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.5 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.6 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.7 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.8 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.9 INSULATING-LAMINATED-GLASS SCHEDULE

A. Manufacturers listed below are for Basis of Design only. Refer to Part 2 for additional manufacturers and approved equals.

B. Low-E-Coated, Clear Insulating Laminated Glass Type GL-01:

1. Basis-of-Design Product: Guardian; Bird 1st Etch SqX22, SNX 62/27, Sunguard IS20.
2. Overall Unit Thickness: 1 5/8"(42 mm).
3. Minimum Thickness of Outdoor Lite: 3/8" (10mm).
4. Outdoor Lite: Clear fully tempered float glass.
5. Interspace Content: Argon.
6. Indoor Lite: Clear laminated glass with two plies of heat-strengthened float glass.

   a. Minimum Thickness of Each Glass Ply: 1/4" (6 mm).
   b. PVB Interlayer Thickness: 0.060 inch (1.52 mm).

7. Low-E Coating: SNX 62/27 Sputtered on second surface, Sunguard IS20 Sputtered on sixth surface.
8. Bird Safety: Bird 1st Etch SqX22 (Non-directional 6mm squares, randomly spaced no more than 2” x 2” apart) etched on first surface
9. Winter Nighttime U-Factor: 0.201 maximum.
10. Summer Daytime U-Factor: 0.133 maximum.
11. Visible Light Transmittance: 57 percent minimum.
12. SGHC: 0.25 maximum.
13. Safety glazing required.

C. Low-E-Coated, Clear Insulating Laminated Glass Type GL-01-B:

1. Basis-of-Design Product: Guardian; SNX 62/27, Sunguard IS20.
2. Overall Unit Thickness: 1 5/8"(42 mm)
3. Minimum Thickness of Outdoor Lite: 3/8" (10mm)
4. Outdoor Lite: Clear fully tempered float glass
5. Interspace Content: Argon
6. Indoor Lite: Clear laminated glass with two plies of heat-strengthened float glass
   a. Minimum Thickness of Each Glass Ply: 1/4" (6 mm)
   b. PVB Interlayer Thickness: 0.060 inch (1.52 mm)

7. Low-E Coating: SNX 62/27 Sputtered on second surface, Sunguard IS20 Sputtered on sixth surface
8. Winter Nighttime U-Factor: 0.201 maximum
9. Summer Daytime U-Factor: 0.133 maximum
10. Visible Light Transmittance: 57 percent minimum
11. SGHC: 0.25 maximum

D. Low-E-Coated, Clear Insulating Laminated Glass Type GL-02:

1. Basis-of-Design Product: Guardian; Bird 1st Etch SqX22, SNX 62/27, Sunguard IS20.
2. Overall Unit Thickness: 1 7/8"(482 mm).
3. Minimum Thickness of Outdoor Lite: 3/8" (10mm).
4. Outdoor Lite: Clear fully tempered float glass.
5. Interspace Content: Argon.
6. Indoor Lite: Clear laminated glass with two plies of heat-strengthened float glass.

   a. Minimum Thickness of Each Glass Ply: 3 mm 3/8"(10 mm).
   b. SGP Interlayer Thickness: 0.060 inch(1.52 mm).

7. Low-E Coating: SNX 62/27 Sputtered on second surface, Sunguard IS20 Sputtered on sixth third surface.
8. Bird Safety: Bird 1st Etch SqX22 (Non-directional 6mm squares, randomly spaced no more than 2” x 2” apart) etched on first surface.
9. Winter Nighttime U-Factor: 0.199 maximum.
10. Summer Daytime U-Factor: 0.132 maximum.
11. Visible Light Transmittance: 56 percent minimum.
12. SGHC: 0.25 maximum.
13. Safety glazing required.

E. Low-E-Coated, Clear Insulating Laminated Glass Type GL-02-B:

1. Basis-of-Design Product: Guardian; SNX 62/27, Sunguard IS20.
2. Overall Unit Thickness: 1 7/8"(48 mm).
3. Minimum Thickness of Outdoor Lite: 3/8" (10mm).
4. Outdoor Lite: Clear fully tempered float glass.
5. Interspace Content: Argon.
6. Indoor Lite: Clear laminated glass with two plies of heat-strengthened float glass.
   a. Minimum Thickness of Each Glass Ply: 3/8"(10 mm)
   b. SGP Interlayer Thickness: 0.060 inch(1.52 mm)
7. Low-E Coating: SNX 62/27 Sputtered on second surface, Sunguard IS20 Sputtered on sixth surface.
8. Winter Nighttime U-Factor: 0.199 maximum
9. Summer Daytime U-Factor: 0.132 maximum

10. Visible Light Transmittance: 56 percent minimum
11. SGHC: 0.25 maximum
12. Safety glazing required

END OF SECTION 088000

SECTION 088300 - MIRRORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Silvered flat glass mirrors.

B. Related Requirements:

1. Section 057500 "Decorative Formed Metal" for stainless steel mirrors.
2. Section 102813 "Toilet Accessories" for metal-framed mirrors.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Mirrors: Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.

B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachment details.

C. Samples: For each type of the following:

1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.
2. Mirror Trim: 12 inches long.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of mirror.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect mirrors in accordance with mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SILVERED FLAT GLASS MIRRORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Binswanger Mirror; a division of Vitro America, Inc.
2. Gardner Glass, Inc.
3. Trulite Glass & Aluminum Solutions, LLC.
4. Or approved equal.

B. Mirrors, General: ASTM C1503; manufactured using copper-free, low-lead mirror coating process.

C. Tempered Glass Mirrors: Mirror Glazing Quality for blemish requirements and complying with ASTM C1048 for Kind FT, Condition A, tempered float glass before silver coating is applied; clear.

1. Nominal Thickness: 6.0 mm.

D. Safety Glazing Products: For film-backed laminated tempered mirrors, provide products that comply with 16 CFR 1201, Category II.

2.2 MISCELLANEOUS MATERIALS

A. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

B. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

2.3 MIRROR HARDWARE

A. Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover edges of mirrors in a single piece.

1. Aluminum J Channel Bottom and Side Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.04 inch.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Andscot Company, Inc.
2) C.R. Laurence Co., Inc.
3) Stylmark, Inc.
4) Or approved equal.

2. Aluminum J Channel Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.04 inch.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Andscot Company, Inc.
2) C.R. Laurence Co., Inc.
3) Stylmark, Inc.
4) Or approved equal.

3. Finish: Clear bright anodized.

B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield, expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.4 FABRICATION

A. Shop fabricate mirrors to greatest extent possible.

B. Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts, so they fit closely around penetrations in mirrors.

C. Mirror Edge Treatment: Flat polished.

1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

D. Film-Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint, as recommended in writing by film-backing manufacturer, to produce a surface free of bubbles, blisters, and other imperfections.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.

B. Verify compatibility with and suitability of substrates, including compatibility of existing finishes or primers with mirror mastic.

C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.3 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

3.4 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced National Glass Association (NGA) publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

1. NGA Publications: "Laminated Glazing Reference Manual," "Glazing Manual" and "Installation Techniques Designed to Prolong the Life of Flat Glass Mirrors."

B. Provide a minimum airspace of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

C. Install mirrors with mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.

1. Aluminum J-Channels: Provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long at bottom channel.

3.5 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirrors to be exposed to standing water.

C. Maintain environmental conditions that prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

D. Clean exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Clean mirrors as recommended in writing by mirror manufacturer and NGA's publication "Proper Procedures for Cleaning Flat Glass Mirrors."

END OF SECTION 088300

SECTION 088813 - FIRE-RATED GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Fire-protection-rated glazing.
2. Fire-resistance-rated glazing.

1.3 DEFINITIONS

A. Fire-Protection-Rated Glazing: Glazing that prevents spread of fire and smoke and complies with requirements for rated openings; incapable of blocking radiant heat.

B. Fire-Resistance-Rated Glazing: Glazing that prevents spread of fire and smoke and radiant heat and complies with requirements for rated walls and rated openings; capable of blocking radiant heat.

C. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

D. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each glazing type.

1. Include plans showing support.

2. Include elevations, sections, details, and attachments to other work.

C. Glass Samples: For each type of glass product; 12 inches square.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For glass testing agency.

B. Product Certificates: For each type of glass and glazing product.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install fire-resistant glazing until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature conditions at occupancy levels during remainder of construction period.

B. Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.11 WARRANTY

A. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Tempered Glazing Units with Clear Intumescent Interlayer: Manufacturer agrees to replace units that deteriorate within specified warranty period. Deterioration of tempered glazing units with clear intumenscent interlayer is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning glass contrary to manufacturer's written instructions. Evidence of failure is air bubbles within units, or obstruction of vision by contamination or deterioration of intumescent interlayer.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Glass: For each glass type, obtain from single source from single manufacturer.

B. Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems must withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or manufacturer. Label must indicate manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

2.4 GLASS PRODUCTS

A. Float Glass: ASTM C1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Low-Iron Float Glass: ASTM C1036, Type I, Quality-Q3, Class I (clear), with visible light transmission not less than 91 percent.

C. Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class I (clear) unless otherwise indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

D. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral interlayer unless fire-protection or fire-resistance rating is based on another product.
2. Interlayer Thickness: Provide thickness as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.5 FIRE-PROTECTION-RATED GLAZING

A. General: Listed and labeled by a testing agency acceptable to NYC BC 2022, for fire-protection ratings indicated, based on positive-pressure testing in accordance with NFPA 257 or UL 9, including hose-stream test, and must comply with NFPA 80.

B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to NYC BC 2022. Label must indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether glazing has passed hose-stream test; whether glazing meets 450 deg F temperature-rise limitation; and fire-resistance rating in minutes.

C. Fire-Protection-Rated Tempered Glass: 6-mm thickness; fire-protection-rated tempered glass; complying with 16 CFR 1201, Category II.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. SAFTI FIRST Fire Rated Glazing Solutions.
b. Technical Glass Products.
c. Vetrotech Saint-Gobain.
d. Or approved equal.

2.6 FIRE-RESISTANCE-RATED GLAZING

A. General: Listed and labeled by a testing agency acceptable to NYC BC 2022, for fire-resistance ratings indicated, based on testing in accordance with ASTM E119 or UL 263.

B. Fire-Resistance-Rated Glazing Labeling: Permanently mark fire-resistance-rated glazing with certification label of a qualified testing agency. Label must indicate manufacturer's name, test standard, that glazing is approved for use in walls, and fire-resistance rating in minutes.

C. Fire-Resistance-Rated Framing and Doors: Fire-resistance-rated glazing with 60-, 90-, and 120-minute ratings and aluminum framing and doors from glass supplier, tested as an assembly complying with ASTM E119 or UL 263.

1. Finish for Aluminum: As indicated or selected by Commissioner from manufacturers full range.

D. Fire-Resistance-Rated Laminated Glass with Intumescent Interlayers: Laminated glass made from multiple plies of uncoated, clear, low-iron float glass; with intumescent interlayers; complying with 16 CFR 1201, Category II.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Pilkington North America.
b. SAFTI FIRST Fire Rated Glazing Solutions.
c. Technical Glass Products.
d. Or approved equal.

2.7 GLAZING ACCESSORIES

A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.
   1. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

   1. AAMA 804.3 tape, where indicated.
   2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
   3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

C. Perimeter Insulation for Fire-Resistance-Rated Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.9 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with manufacturing and installation tolerances, including those for size, squareness, and offsets at corners, and for compliance with minimum required face and edge clearances.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate fire side and protected side. Label or mark units as needed so that fire side and protected side are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.4 GLAZING, GENERAL

A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.

B. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch- minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.

I. Set glass lites with proper orientation so that coatings face fire side or protected side as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.5 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.6 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop, so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

D. Install gaskets so they protrude past face of glazing stops.

3.7 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.8 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088813

SECTION 088853 - SECURITY GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes:

1. Polycarbonate security glazing.
2. Insulating security glazing.

1.3 DEFINITIONS

A. Glazing Manufacturers: Firms that produce primary glass, monolithic plastic glazing, or fabricated security glazing, as defined in referenced glazing publications.

B. Interspace: Space between lites of air-gap security glazing or insulating security glazing.

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on security glazing, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for security glazing during and after installation.

1.6 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each glazing type.

1. Include plans showing support.
2. Include elevations, sections, details, and attachments to other work.
3. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.

C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of sealant.

D. Samples for Verification:

1. Glazing: Actual sample of finished products for each type of security glazing.
2. Glazing Accessories: Actual sample of sealants. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
3. Size: Manufacturers' standard size.

E. Security Glazing Schedule: List security glazing types and thicknesses for each size opening and location. Use same designations indicated on Drawings. Indicate coordinated dimensions of security glazing and construction that receives security glazing, including clearances and glazing channel dimensions.

1.8 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports:

1. Product Test Reports:

a. For each type of security glazing, for tests performed by a manufacturer and witnessed by a qualified testing agency.
b. For each type of glazing sealant, for tests performed by a qualified testing agency.

1) Provide test reports based on testing current sealant formulations within previous 36-month period.

2. Preconstruction Test Reports: For preconstruction adhesion and compatibility testing.

B. Sample warranties.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Qualifications:

1. Manufacturers: For insulating or air-gap security glazing units with sputter-coated, low-e coatings, a qualified insulating glazing manufacturer who is approved by coated-glass manufacturer.
2. Installers: Entity that employs installers and supervisors who are properly trained by manufacturer.
3. Engineering Services Engineer: A professional engineer who is licensed in the State of New York and who is experienced in providing engineering services of type indicated.

4. Security Glazing Testing Agency: Subject to compliance with requirements, testing agency is one of the following:

   a. Intertek.
   b. Underwriters Laboratories, Inc.
   c. Wiss, Janney, Elstner Associates, Inc.
   d. Or approved equal..

5. Sealant Testing Agency: An independent testing agency qualified in accordance with ASTM C1021 to conduct the testing indicated.

1.10 MOCKUPS

A. Build mockups to set quality standards for materials and execution.

1. Install security glazing in mockups specified in Section 084213 "Aluminum-Framed Entrances "Section 084413 "Glazed Aluminum Curtain Walls" to match glazing systems required for Project, including glazing methods.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.11 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each security glazing type, tape sealant, gasket, glazing accessory, and glazing-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing will not be required if data based on previous testing of current sealant products and glazing materials match those submitted.
2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to security glazing, tape sealants, gaskets, and glazing channel substrates.
3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Protect security glazing and glazing materials according to manufacturer's written instructions. Prevent damage from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating security glazing and with air-gap security glazing manufacturers' written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.13 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.14 WARRANTY

A. Special Warranty, Monolithic Polycarbonate Security Glazing: Manufacturer agrees to replace monolithic polycarbonate security glazing that fails in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Defects developed from normal use that are not attributed to maintaining and cleaning monolithic polycarbonate security glazing contrary to manufacturer's written instructions. Defects include yellowing and loss of light transmission.

2. Warranty Period: 10 years from date of Substantial Completion.

B. Special Warranty, Insulating Security Glazing: Manufacturer agrees to replace insulating security glazing that fails in materials and workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Defects in individual lites developed from normal use or failure of hermetic seal under normal use. Defects in individual lites or failure of hermetic seal that is attributed to glass breakage or to maintaining and cleaning insulating security glazing contrary to manufacturer's written instructions are not included.
b. Defects in coated-glass lites include peeling, cracking, and other indications of deterioration in coating.
c. Defects in laminated-glass lites include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
d. Defects in polycarbonate lites include edge separation, delamination materially obstructing vision through glazing, blemishes exceeding those allowed by referenced glass-clad polycarbonate standard, yellowing, and loss of light transmission.
e. Evidence of hermetic seal failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glazing.

2. Warranty Period: 10 years from date of Substantial Completion.

C. Special Warranty, Bird Safety Film: Manufacturer agrees to replace Bird Safe Film that fails in materials and workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Delamination of film , including edge separation, peeling air bubbles or any visual blemishes caused by delamination .
b. Yellowing, discoloration or loss of light transmission
c. Cracking or crazing of film.
d. Loss of contrast in birdsafe pattern or other defect effecting threat factor rating.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of security glazing from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General:

1. Installed security glazing will withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
2. Installed security glazing will withstand security-related loads and forces without damage to the glazing beyond that allowed by referenced standards.

B. Structural Performance: Glazing will withstand the following design loads within limits and under conditions indicated.

1. Design Procedure for Glass: ASTM E1300 and the NYC Building Code.
2. Design Wind Pressures: Determine design wind pressures applicable to Project in accordance with ASCE/SEI 7, based on heights above grade indicated on Drawings.

a. Wind Design Data: As indicated on Drawings.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

D. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

E. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

2.3 SECURITY GLAZING, GENERAL

A. Glazing Publications: Comply with published recommendations of security glazing and glazing material manufacturers and organizations below unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: "Laminated Glazing Reference Manual" and "GANA Glazing Manual."

B. Plastic Glazing Labeling: Identify plastic sheets with appropriate markings of applicable testing and inspecting agency, indicating compliance with required fire-test-response characteristics.

C. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the Safety Glazing Certification Council. Label will indicate manufacturer's name, type of glazing, glass thickness, and safety glazing standard with which glazing complies.

D. Fire-Test-Response Characteristics of Polycarbonate Sheets: As determined by testing polycarbonate sheets identical to those used in security glazing products by a qualified testing agency.

1. Self-ignition temperature of 650 deg F or more when tested in accordance with ASTM D1929 on plastic sheets in thicknesses indicated for the Work.
2. Smoke-Developed Index of 450 or less when tested in accordance with ASTM E84 or UL 723, or smoke density of 75 or less when tested in accordance with ASTM D2843 on plastic sheets in thicknesses indicated for the Work.
3. Burning extent of 1 inch or less when tested in accordance with ASTM D635 at a nominal thickness of 0.060 inch or thickness indicated for the Work.

2.4 POLYCARBONATE SECURITY GLAZING

A. Basis-of-Design Product: Subject to compliance with requirements, provide Impact Security LLC; DefenseLite or comparable product by one of the following:

1. Global Security Glazing.
2. Oldcastle BuildingEnvelope (OBE); CRH Americas.
3. Riot Glass.
4. Or approved equal.

B. Monolithic Polycarbonate Security Glazing: ASTM C1349, Appendix X1, Type II, coated, mar-resistant, UV-stabilized polycarbonate with coating on exposed surfaces and Type I, standard, UV-stabilized polycarbonate where no surfaces are exposed.

C. Laminated-Polycarbonate Security Glazing: Two or more polycarbonate sheets bonded with clear urethane interlayer that complies with ASTM C1349, Appendix X2, and has a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation. Provide laminated units that comply with requirements of ASTM C1349 for maximum allowable laminating process blemishes and haze.

D. Thickness: 3/8" thick

2.5 INSULATING SECURITY GLAZING

A. Basis-of-Design Product: Subject to compliance with requirements, provide Riot Glass; Armor Plast IGU or comparable product by one of the following:

1. Viracon, Inc.
2. Impact Security LLC
3. Or approved equal.

B. Insulating Security Glazing: Factory-assembled units, consisting of sealed lites of glazing material indicated separated by a dehydrated interspace, qualified in accordance with ASTM E2190

C. Insulated Glass: Refer to Section 088000 - "Glazing".

2.6 BIRD SAFETY FILM

A. Bird Safety Film: Manufacturer provided film, compatible with polycarbonate security glazing and providing pattern approved for use in bird safety glazing.

1. Pattern: Match etch pattern in adjacent architectural glazing. (Refer to Section 088000 - "Glazing".)
2. Threat Factor: Film and pattern to have a maximum threat factor of 25 in accordance with the American Bird Conservancy Bird Collision Deterrence Material Threat Factor Reference Standard, or with the American Bird Conservancy Bird-friendly Materials Evaluation Program at Carnegie Museum’s Avian Research Center Test Protocol, or with a relevant ASTM standard.

2.7 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they contact, including security glazing, seals of insulating security glazing and air-gap security glazing, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and security glazing manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

B. Glazing Sealant:

1. Neutral-Curing Silicone Glazing Sealant, Class 100/50: Complying with ASTM C920, Type S, Grade NS, Use NT.

C. Security Sealant: Manufacturer's standard, nonsag, tamper-resistant sealant for joints with low movement complying with ASTM C920, Grade NS, Class 12.5 or 25, Use NT, and with a Shore A hardness of at least 45 when tested in accordance with ASTM C661.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and security glazing manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of security glazing and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks:

1. EPDM or Silicone with Shore A durometer hardness of 85, plus or minus 5.
2. Type recommended in writing by sealant or glass manufacturer.

D. Spacers:

1. Neoprene blocks or continuous extrusions of hardness required by security glazing manufacturer to maintain security glazing lites in place for installation indicated.
2. Type recommended in writing by sealant or security glazing manufacturer.

E. Edge Blocks:

1. EPDM or Silicone with Shore A durometer hardness in accordance with manufacturer's written instructions.
2. Type recommended in writing by sealant or security glazing manufacturer.

F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.10 FABRICATION OF SECURITY GLAZING

A. Fabricate security glazing in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Grind smooth and polish exposed security glazing edges and corners.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine framing for security glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.

2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Minimum required bite.
5. Effective sealing between joints of framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean glazing channels and other framing members receiving security glazing immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.4 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of security glazing, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect edges of security glazing from damage during handling and installation. Remove damaged security glazing from Project site and legally dispose of it off Project site. Damaged security glazing includes units with edge or face damage or other imperfections that, when installed, could weaken security glazing and impair performance and appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glazing unit manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by security glazing manufacturers for installing lites.

F. Provide spacers for security glazing lites where the length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of security glazing. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glazing lites and use thickness equal to sealant width. With glazing tape, use thickness of slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent security glazing from moving sideways in glazing channel, as recommended in writing by security glazing manufacturer and in accordance with requirements in referenced glazing publications.

H. Set security glazing in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set coated security glazing with proper orientation so that coatings and films face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.5 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by security glazing, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center security glazing in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.6 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended in writing by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glazing unit and frame or fixed stop, so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center security glazing in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in security glazing. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center security glazing in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in security glazing. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.7 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between security glazing and glazing stops to maintain face clearances and to prevent sealant from extruding into glazing channel and blocking weep systems. Secure spacers, or spacers and backings, in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to security glazing and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from security glazing.

3.8 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect security glazing from contact with contaminating substances resulting from construction operations, including weld splatter. Examine security glazing surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with security glazing, remove substances immediately as recommended in writing by security glazing manufacturer. Remove and replace security glazing that cannot be cleaned without damage.

C. Wash security glazing on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash security glazing as recommended in writing by security glazing manufacturer.

END OF SECTION 088853

SECTION 092116.23 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Gypsum board shaft assemblies, vertical and horizontal application.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each component of gypsum board shaft wall assembly.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and support them on risers on a flat platform to prevent sagging.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Comply with gypsum-shaftliner-board manufacturer's written instructions.

B. Do not install finish panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E90 and classified according to ASTM E413 by a testing and inspecting agency.

2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES

A. Fire-Resistance Rating: As indicated on Drawings.

B. STC Rating: As indicated on Drawings.

C. Gypsum Shaftliner Board:

1. Moisture- and Mold-Resistant Type X: ASTM C1396/C1396M; manufacturer's standard fire-resistive liner panels with ASTM D3273 mold-resistance score of 10 as rated according to ASTM D3274, 1 inch thick, and with double beveled long edges.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) CertainTeed Gypsum.
2) Continental Building Products, LLC.
3) Georgia-Pacific Gypsum LLC.
4) National Gypsum Company.
5) USG Corporation.
6) Or approved equal.

D. Non-Load-Bearing Steel Framing, General: Complying with ASTM C645 requirements for metal unless otherwise indicated and complying with requirements for fire-resistance-rated assembly indicated.

1. Studs and Runner Tracks including Protective Coating: As specified in Section 092216 "Non-structural Metal Framing."

E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs

1. As specified in Section 092216 "Non-structural Metal Framing."

F. Finish Panels: Gypsum board as specified in Section 092900 "Gypsum Board.".

G. Sound Attenuation Blankets: As specified in Section 092900 "Gypsum Board."

2.3 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with shaft wall manufacturer's written instructions.

B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in Section 092900 "Gypsum Board" that comply with gypsum board shaft wall assembly manufacturer's written instructions for application indicated.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.

E. Acoustical Sealant: Refer to Section 092900 "Gypsum Board."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated and manufacturer's written installation instructions.

B. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.

C. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.

D. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons and floor indicators, and similar items.

E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels while maintaining continuity of fire-rated construction.

F. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

G. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Commissioner while maintaining fire-resistance rating of gypsum board shaft wall assemblies.

H. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.

I. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.4 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092116.23

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Framing systems.
2. Suspension system for gypsum board ceilings.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for exterior non-load-bearing wall studs.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Recycled Content: Provide manufacturer documentation for recycled content, indicating postconsumer and preconsumer recycled content.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified in accordance with the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, the Steel Stud Manufacturers Association, or the Supreme Steel Framing System Association.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Notify manufacturer of damaged materials received prior to installation.

B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI S202, "Code of Standard Practice for Cold-Formed Steel Structural Framing."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, in accordance with ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, in accordance with ASTM E90 and classified in accordance with ASTM E413 by an independent testing agency.

C. Horizontal Deflection: For wall assemblies, limited to 1/360 of the wall height based on horizontal loading of 5 lbf/sq. ft..

D. Design framing systems in accordance with AISI S220, "North American Specification for the Design of Cold-Formed Steel Framing - Nonstructural Members," unless otherwise indicated.

E. Design Loads: As indicated on architectural Drawings or 5 lbf/sq. ft. minimum as required by the IBC.

F. Design framing systems to accommodate deflection of primary building structure and construction tolerances and to withstand design loads with a maximum deflection of 1 inch.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with AISI S220 for conditions indicated.

1. Steel Sheet Components: Comply with AISI S220 requirements for metal unless otherwise indicated
2. Protective Coating: Comply with AISI S220; ASTM A653/A653M, G40; except G90 for framing used at exterior walls and in moisture-prone areas, or coating with equivalent corrosion resistance. Galvannealed products are unacceptable.

   a. Coating demonstrates equivalent corrosion resistance with an evaluation report acceptable to Commissioner.

B. Studs and Track: AISI S220.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ClarkDietrich.
    b. Jaimes Industries.
    c. MarinoWARE.
    d. Telling Industries.
    e. The Steel Network, Inc.
    f. Or approved equal.

2. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection.
3. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where required, provide one of the following:

1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing minimum vertical movement.
2. Single Long-Leg Track System: Top track with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
3. Double-Track System: Top outer tracks, inside track with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
4. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

D. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

F. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.

G. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges.

1. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
2. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

H. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 3/4 inch, minimum uncoated-steel thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

A. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.

B. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings.

C. Furring Channels (Furring Members):

1. Resilient Furring Channels: 1/2-inch- deep members designed to reduce sound transmission.

a. Configuration: hat shaped.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.4 INSTALLATION, GENERAL

A. Installation Standard: ASTM C754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.5 INSTALLATION OF FRAMING SYSTEMS

A. Install framing system components in accordance with spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: As required by horizontal deflection performance requirements unless otherwise indicated.
2. Multilayer Application: As required by horizontal deflection performance requirements unless otherwise indicated.
3. Tile Backing Panels: As required by horizontal deflection performance requirements unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:

    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.6 INSTALLATION OF SUSPENSION SYSTEMS

A. Install suspension system components in accordance with spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches o.c.

2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 16 inches o.c. unless otherwise indicated

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

   a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

   a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
3. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing when reqired by Building Code for project application: Sway-brace suspension systems with hangers used for support.

3.7 FIELD QUALITY CONTROL

A. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Tile backing panels.

B. Related Requirements:

1. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
2. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
3. Section 093013 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Gypsum wallboard.
2. Gypsum board, Type X.
3. Gypsum ceiling board.
4. Impact-resistant gypsum board.
5. Mold-resistant gypsum board.
6. Exterior gypsum soffit board.
7. Cementitious backer units.
8. Interior trim.
9. Aluminum trim.
10. Joint treatment materials.
11. Laminating adhesive.
12. Sound-attenuation blankets.
13. Acoustical sealant.

B. Sustainable Design Submittals:

1. Recycled Content: Provide manufacturer documentation for recycled content, indicating postconsumer and preconsumer recycled content.
2. Environmental Product Declaration (EPD): For each product.
3. Product Data: For adhesives and sealants, indicating VOC content.
4. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
5. Laboratory Test Reports: For ceiling and wall materials, indicating compliance with requirements for low-emitting materials.

C. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 MOCKUPS

A. Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockups for the following:

a. Each level of gypsum board finish indicated for use in exposed locations.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of gypsum panel and joint finishing material from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated in accordance with ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated in accordance with ASTM E90 and classified in accordance with ASTM E413 by an independent testing agency.

2.3 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.4 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. CertainTeed Corporation; Saint-Gobain North America.
   b. Continental Building Products, LLC.
   c. Georgia-Pacific Gypsum LLC.
   d. National Gypsum Company.
   e. USG Corporation.
   f. Or approved equal.

2. Thickness: 1/2 inch.
3. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C1396/C1396M.

1. Thickness: 5/8 inch.

C. Gypsum Ceiling Board: ASTM C1396/C1396M.

1. Thickness: 1/2 inch.
2. Long Edges: Tapered.

D. Impact-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested in accordance with ASTM C1629/C1629M.

1. Long Edges: Tapered.
2. Mold Resistance: ASTM D3273, score of 10 as rated in accordance with ASTM D3274.

E. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

1. Long Edges: Tapered.
2. Mold Resistance: ASTM D3273, score of 10 as rated in accordance with ASTM D3274.

2.5 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Exterior Gypsum Soffit Board: ASTM C1396/C1396M, with manufacturer's standard edges.

2.6 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation; Saint-Gobain North America.
b. Custom Building Products.
c. National Gypsum Company.
d. USG Corporation.
e. Or approved equal.

2. Thickness: As indicated.
3. Mold Resistance: ASTM D3273, score of 10 as rated in accordance with ASTM D3274.

2.7 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. U-Bead: J-shaped; exposed short flange does not receive joint compound.
d. Expansion (control) joint.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221, Alloy 6063-T5.
2. Finish: Class II anodic finishes and factory-painted, baked-enamel finishes.

2.8 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

2. Fill Coat: For second coat, use compound.
3. Finish Coat: For third coat, use compound.

D. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.9 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C834.:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Everkem Diversified Products, Inc.
b. Franklin International.
c. Grabber Construction Products, Inc.
d. Specified Technologies Inc.
e. Or approved equal.

2. Colors of Exposed Acoustical Joint Sealants: As selected by Commissioner from manufacturer's full range of colors.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Comply with ASTM C840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.4 INSTALLATION OF INTERIOR GYPSUM BOARD

A. Install interior gypsum board as indicated on Drawings.

1. Type X: Where required for fire-resistance-rated assembly.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

E. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.5 INSTALLATION OF EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.

1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.

3.6 INSTALLATION OF TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.7 INSTALLATION OF TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim in accordance with manufacturer's written instructions.

B. Control Joints: Install control joints in accordance with ASTM C840 and in specific locations approved by Commissioner for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where indicated.
4. Curved-Edge Cornerbead: Use at curved openings.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.8 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and in accordance with ASTM C840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 3: Where indicated on Drawings.
4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

E. Cementitious Backer Units: Finish in accordance with manufacturer's written instructions.

3.9 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093013 - CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Porcelain tile.
2. Glazed wall tile.
3. Thresholds.
4. Tile backing panels.
5. Waterproof membranes.
6. Crack isolation membranes.
7. Setting material.
8. Grout materials.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for sealing of movement joints in tile surfaces.
2. Section 092900 "Gypsum Board" for tile backing panels.

1.3 DEFINITIONS

A. General: Definitions in ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. Face Size: Actual tile size, excluding spacer lugs.

C. Large Format Tile: Tile with at least one edge 15 inches or longer.

D. Module Size: Actual tile size plus joint width indicated.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data:

1. Pressed floor tile.
2. Porcelain tile.
3. Ceramic mosaic tile.
4. Glazed wall tile.
5. Thresholds.
6. Tile backing panels.
7. Waterproof membranes.
8. Crack isolation membranes.
9. Setting material.
10. Grout materials.

B. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
3. Full-size units of each type of trim and accessory for each color and finish required.
4. Stone thresholds in 6-inch lengths.
5. Metal flooring transitions 6-inch lengths.

C. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
2. Health Product Declaration: For each product.
3. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.

1.7 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of product, including product use classification.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

1.11 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard Grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.2 PORCELAIN TILE

A. Porcelain Tile Type : Unglazed.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Architecture Drawings by Daltile or comparable product by one of the following:

   a. Crossville, Inc.
   b. Florida Tile, Inc.
   c. Portobello America, Inc.
   d. Or approved equal.

2. Certification: Tile certified by the Porcelain Tile Certification Agency.
3. Face Size: Per drawings.
4. Face Size Variation: Rectified.
5. Product Use Classification: Interior, Wet Plus (IW+).
6. Tile Color, Glaze, and Pattern: As indicated by manufacturer's designations.
7. Grout Color: As selected by Commissioner from manufacturer's full range.
8. Precoat with temporary protective coating.

2.3 GLAZED WALL TILE

A. Glazed Wall Tile Type :

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Architecture Drawings by Nemo Tile or comparable product by one of the following:

   a. Crossville, Inc.
   b. Daltile; a brand of Dal-Tile Corporation.
   c. Interceramic.
   d. Or approved equal.

2. Module Size: As indicated on Finish Schedule.
3. Face Size Variation: Rectified.
4. Thickness: 5/16 inch unless otherwise indicated
5. Tile Color and Pattern: As selected by Commissioner from manufacturer's full range.
6. Grout Color: As selected by Commissioner from manufacturer's full range.
7. Mounting:

   a. Factory, back mounted.

2.4 TILE BACKING PANELS

A. Cementitious Backer Units: Refer to Section 092900 "Gypsum Board.".

2.5 WATERPROOF MEMBRANES

A. General: Manufacturer's standard product that complies with ANSI A118.10 and ANSI A118.12 and is recommended by manufacturer for application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Waterproof Membrane, Fluid Applied: Liquid-latex rubber or elastomeric polymer with continuous fabric reinforcement.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ARDEX Americas.
b. Custom Building Products.
c. Laticrete International, Inc.
d. MAPEI Corporation.
e. Or approved equal.

2.6 CRACK ISOLATION MEMBRANES

A. General: Manufacturer's standard product that complies with ANSI A118.12 for high performance and is recommended by manufacturer for application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Crack Isolation Membrane, Fluid Applied: Liquid-latex rubber or elastomeric polymer with continuous fabric reinforcement.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Custom Building Products.
b. Laticrete International, Inc.
c. MAPEI Corporation.
d. Or approved equal.

2.7 SETTING MATERIALS

A. Modified Dry-Set Mortar (Thinset): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ARDEX Americas.
b. Custom Building Products.
c. Laticrete International, Inc.

d. MAPEI Corporation.
e. Or approved equal.

2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to other requirements in ANSI A118.4.

B. Improved Modified Dry-Set Mortar (Thinset): ANSI A118.15.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ARDEX Americas.
b. Custom Building Products.
c. Laticrete International, Inc.
d. MAPEI Corporation.
e. Or approved equal.

2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to other requirements in ANSI A118.15.

2.8 GROUT MATERIALS

A. High-Performance Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ARDEX Americas.
b. Custom Building Products.
c. Laticrete International, Inc.
d. MAPEI Corporation.
e. Or approved equal.

2.9 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting and adhesive materials for installations indicated.

B. Metal Flooring Transitions: Profile designed specifically for flooring applications; height to match tile and setting-bed thickness.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Schluter Systems L.P or comparable product by one of the following:

a. Blanke Corporation.
b. Custom Building Products.
c. Or approved equal.

2. Description: L-shaped.
3. Material and Finish: Metallic or combination of metal and PVC or neoprene base; white zinc alloy exposed-edge material.

C. Metal Edge Trim: Profile designed for wall terminations (Wainscot) and edge protection.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Schluter Systems L.P or comparable product by one of the following:

   a. Blanke Corporation.
   b. Custom Building Products.
   c. Or approved equal.

2. Description: As indicated.
3. Material and Finish: Color-coated aluminum exposed-edge material.

   a. Color: As indicated.

D. Temporary Protective Coating: Formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products and easily removable after grouting is completed without damaging grout or tile.

E. Grout Sealer: Grout manufacturer's standard product for sealing grout joints that does not change color or appearance of grout.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

   a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
   b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Commissioner.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Remove coatings, including curing compounds or other coatings, that are incompatible with tile-setting materials.

B. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

C. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1 and is sloped 1/4 inch per foot toward drains.

D. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

E. Substrate Flatness:

1. For tile shorter than 15 inches, confirm that structure or substrate is limited to variation of 1/4 inch in 10 ft. from the required plane, and no more than 1/16 inch in 12 inches when measured from tile surface high points.
2. For large format tile, tile with at least one edge 15 inches or longer, confirm that structure or substrate is limited to 1/8 inch in 10 ft. from the required plane, and no more than 1/16 inch in 24 inches when measured from tile surface high points.

F. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.4 INSTALLATION OF CERAMIC TILE SYSTEM

A. Install tile backing panels and treat joints in accordance with ANSI A108.11 and manufacturer's written instructions for type of application indicated.

B. Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

1. Allow waterproof membrane to cure and verify by testing that it is watertight before installing tile or setting materials over it.

C. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

1. Allow crack isolation membrane to cure before installing tile or setting materials over it.

D. Mix mortars and grouts to comply with grout manufacturers' written instructions.

1. Add materials, water, and additives in accurate proportions.

2. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

E. Install tile in accordance with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of ANSI A108 series that are referenced in TCNA installation methods and specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

   a. Tile floors in wet areas.
   b. Tile floors consisting of tiles 8 by 8 inches or larger.
   c. Tile floors consisting of rib-backed tiles.

2. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
3. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
4. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
5. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
6. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

   a. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets, so joints between sheets are not apparent in finished Work.
   b. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
   c. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

7. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

F. Movement Joints: Provide movement joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated on Drawings. Form joints during installation of setting materials, mortar beds, and tile. Keep joints free of dirt, debris, and setting materials prior to filling with sealants. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

G. Thresholds: Install stone and solid surface thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

1. Do not extend waterproof membrane or crack isolation membrane under thresholds set in modified dry-set or improved modified dry-set mortar. Fill joints between such thresholds and adjoining tile set on waterproof membrane or crack isolation membrane with elastomeric sealant.

H. Metal Flooring Transitions: Install at locations indicated.

I. Metal Wall Trim: Install at locations indicated on Drawings.

J. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors in accordance with manufacturer's written instructions. As soon as sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.5 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile in accordance with tile and grout manufacturer's written instructions. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.6 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.7 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. TCNA F125-Full : Thinset mortar on crack isolation membrane.

a. Ceramic Tile Type: As indicated on Finish Schedule.
b. Thinset Mortar: Modified dry-set and Improved modified dry-set mortar.
c. Grout: High-performance cement grout.
d. Crack Isolation Membrane: Fabric-reinforced, fluid-applied membrane.
e. Joint Width: As required by tile product manufacturer.

B. Interior Floor Installations, Wood Subfloor:

1. TCNA F142 : Organic adhesive on plywood underlayment.

a. Ceramic Tile Type: As indicated on Finish Schedule.
b. Grout: High-performance grout.
c. Joint Width: As required by tile product manufacturer.

C. Interior Wall Installations, Metal Studs or Furring:

1. TCNA W242 : Organic adhesive on gypsum board.

a. Ceramic Tile Type: As indicated on Finish Schedule.
b. Grout: Water-cleanable epoxy grout.
c. Joint Width: As required by tile product manufacturer.

2. TCNA W245 : Thinset mortar on backer board.

a. Ceramic Tile Type: As indicated on Finish Schedule.
b. Thinset Mortar: Modified dry-set or Improved modified dry-set mortar.
c. Grout: High-performance cement grout.
d. Joint Width: As required by tile product manufacturer.

END OF SECTION 093013

SECTION 095100 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Acoustical tiles.
2. Metal panels.
3. Open-cell ceilings.
4. Metal suspension systems.
5. Accessories.
6. Metal edge moldings and trim.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Each ceiling product including grid indicated.
2. Metal suspension systems.
3. Accessories.
4. Metal edge moldings and trim.

B. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
2. Health Product Declaration: For each product.
3. Product Data: For adhesives, indicating VOC content.

4. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
5. Laboratory Test Reports: For ceiling products, indicating compliance with requirements for low-emitting materials.

C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension-system members.
2. Structural members to which suspension systems will be attached.
3. Method of attaching hangers to building structure.

   a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
5. Size and location of initial access modules for acoustical tile.
6. Items penetrating finished ceiling and ceiling-mounted items including the following:

   a. Lighting fixtures.
   b. Diffusers.
   c. Grilles.
   d. Speakers.
   e. Sprinklers.
   f. Access panels.
   g. Perimeter moldings.

7. Minimum Drawing Scale: 1/4 inch = 1 foot.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Product Test Reports: For each acoustical tile ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical ceiling area as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Source Limitations for Suspended Acoustical Tile Ceiling System: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance, when required by project application: Suspended ceilings to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7 and the Building Code.

B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A.

2.3 ACOUSTICAL TILES

A. Basis-of-Design Products: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; Optima and Rockfon; Rockwool International; Koral at moisture-prone, "Wet Areas" or comparable product by one of the following:

1. Certainteed; SAINT-GOBAIN.
2. Rockfon; Rockwool International.
3. USG Corporation.

4. Or approved equal.

B. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Classification: Provide tiles as follows:

1. Type and Form: As indicated by manufacturer's designation.
2. Pattern: As indicated by manufacturer's designation.

D. Color: As indicated by manufacturer's designation.

E. Light Reflectance (LR): As indicated by manufacturer's designation.

F. Ceiling Attenuation Class (CAC): As indicated by manufacturer's designation.

G. Edge/Joint Detail: As indicated by manufacturer's designation.

H. Thickness: As indicated by manufacturer's designation.

I. Modular Size: As indicated on Drawings.

J. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested in accordance with ASTM D3273, ASTM D3274, or ASTM G21 and evaluated in accordance with ASTM D3274 or ASTM G21.

2.4 METAL PANELS

A. Basis-of-Design Products (GR-2): Subject to compliance with requirements, provide Armstrong World Industries, Inc.; Metalworks 3D or comparable product by one of the following:

1. Certainteed; SAINT-GOBAIN.
2. Rockfon; Rockwool International.
3. USG Corporation.
4. Or approved equal.

B. Acoustical Standard: Provide manufacturer's standard units of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Material: 0.040 inch thick aluminum sheet.

D. Beam Grid Module: As indicated on Drawings.

E. Beam Width by Height: As indicated on Drawings.

F. Cell Panel Module: As indicated on Drawings.

G. Cell Module: As indicated on Drawings.

H. Cell Profile, Width by Height: As indicated on Drawings.

I. Painted finishes: Factory-applied polyester paint.

1. Custom colors: As indicated on Finish Schedule, matching 'RAL' colors and adjacent wall colors.

2.5 OPEN-CELL CEILINGS

A. Basis-of-Design Products (ACT-5): Subject to compliance with requirements, provide Armstrong World Industries, Inc.; FeltWorks with Hanging Kit or comparable product by one of the following:

1. Certainteed; SAINT-GOBAIN.
2. Rockfon; Rockwool International.
3. USG Corporation.
4. Or approved equal.

B. Material: 1/4 inch thick non-woven layered and formed polyester felt (PET) fiber panels with color throughout.

C. Configuration, Type, and Color(s): As indicated on drawings.

D. Fire Performance: Flame Spread Index 25 or less. Smoke Developed Index 450 or less. Class A per ASTM E84.

E. Acoustical Performance: Tested per ASTM C423 and mounted in accordance with ASTM E795.Sound absorption of 0.52 Sabins/SF.

F. Aluminum Suspension System: Each hanging kit includes 4 hanging assemblies. Use one kit for each suspension bar.

2.6 METAL SUSPENSION SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by same manufacturer as acoustical tile used.

B. Metal Suspension-System Standard: Provide manufacturer's standard, in-direct-hung, fully-concealed, metal suspension systems and accessories of type, structural classification, and finish indicated that complies with applicable requirements in ASTM C635/C635M.

1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" in accordance with ASTM C635/C635M.

C. Capped, Double-Web, Steel Suspension System for Acoustical Tile and Metal Panels: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 (Z90) coating designation; with prefinished - 9/16-inch- (15-mm-) wide metal caps on flanges.

1. Basis-of-Design Product: Subject to compliance with requirements, provide products Armstrong World Industries, Inc.; Suprafine XL or comparable product by one of the following:

a. Armstrong World Industries, Inc.
b. Certainteed; SAINT-GOBAIN
c. Rockfon; Rockwool International.USG Corporation.
d. Or approved equal.

2. Structural Classification: Intermediate-duty system.
3. Type: Override (stepped) or butt-edge.
4. Face Design: Flat, flush.
5. Cap Material: Cold-rolled steel.
6. Access where required for Metal Panel System: Upward, Downward, and end pivoted, or side pivoted, as schedules with initial access openings of size indicated below and located throughout ceiling within each module formed by main and cross runners, with additional access available by progressively removing remaining acoustical tiles.

a. Initial Access Opening: In each module, As indicated on Drawings.

D. Moisture-prone, "Wet Areas" Suspension System: Main and cross runners formed from and capped with aluminum sheet, alloy and temper recommended by producer and finisher; with prefinished 9/16-inch-(15-mm-) wide metal caps on flanges.

1. Structural Classification: Intermediate-duty system.
2. Type: Override (stepped) or butt-edge.
3. Face Design: Flat, flush.
4. Cap Material: Aluminum.

2.7 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M unless otherwise indicated. Comply with seismic design requirements when required by project application.

1. Anchors in Concrete: Anchors of type and material indicated below, with holes for attaching hangers of type required and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing in accordance with ASTM E488/E488M or ASTM E1512 as applicable, conducted by a qualified testing and inspecting agency.

a. Type: Postinstalled bonded anchors.
b. Corrosion Protection, Carbon Steel: Components zinc plated in accordance with ASTM B633, Class SC 1 (mild) service condition.
c. Moisture-prone,"Wet Areas:" Corrosion Protection, Stainless Steel: Components complying with ASTM F593 and ASTM F594, Group 1 Alloy 304.

B. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

C. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

E. Seismic Clips, where required: Manufacturer's standard seismic clips designed to secure acoustical tiles in-place during a seismic event.

2.8 METAL EDGE MOLDINGS AND TRIM

A. Manufacturers: Subject to compliance with requirements, provide products by same manufacturer as acoustical tile or comparable product by one of the following:

1. Certainteed; SAINT-GOBAIN.
2. Fry Reglet Corporation.
3. USG Corporation.
4. Or approved equal.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for of suspension-system runners.

1. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
2. Finish: Painted to match color of acoustical unit.

C. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.

1. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils. Comply with ASTM C635/C635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.9 ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Section 092900 "Gypsum Board."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Testing Substrates: Before adhesively bonding tiles to wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

C. Layout openings for penetrations centered on the penetrating items.

3.4 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

A. Install suspended acoustical tile ceilings in accordance with ASTM C636/C636M, seismic design requirements when required by project application and manufacturer's written instructions.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
6. Do not attach hangers to steel deck tabs.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
9. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Arrange directionally patterned acoustical tiles as follows:

1. As indicated on reflected ceiling plans.

G. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges of tiles so tile-to-tile joints are interlocked.

1. Fit adjoining tiles to form flush, tight joints. Scribe and cut tiles for accurate fit at borders and around penetrations through ceiling.
2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tiles and moldings, spaced 12 inches o.c.
3. Protect lighting fixtures and air ducts in accordance with requirements indicated for fire-resistance-rated assembly.

3.5 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.

B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: City of New York will engage a qualified special inspector to perform the following special inspections:

1. Periodic inspection during the installation of suspended ceiling grids in accordance with ASCE/SEI 7.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Acoustical tile ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.7 ADJUSTING

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095100

SECTION 096466 - WOOD ATHLETIC FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Wood flooring assemblies.

B. Related Requirements:

1. Section 096513 "Resilient Base and Accessories" for vent cove wall base.

1.3 COORDINATION

A. Coordinate layout and installation of slab depressions to accommodate layout and height of wood athletic flooring assembly.

B. Coordinate layout and installation of flooring with floor inserts for gymnasium equipment.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for wood athletic flooring.

B. Shop Drawings: For each type of floor assembly, include the following:

1. Plans, sections, and attachment details.
2. Details of concrete-slab depressions.
3. Locations of different grades of wood flooring.
4. Expansion provisions and trim details.
5. Layout, colors, widths, and dimensions of game lines and markers.
6. Locations of floor inserts for athletic equipment installed through flooring assembly.

C. Samples: For each exposed product and for each color and texture specified, approximately 12 inches long in size.

1. Include Sample sets showing the full range of normal color and texture variations expected in wood flooring.
2. Include Sample sets showing finishes and game-line and marker paints applied to wood flooring.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each wood athletic flooring system, for tests performed by a qualified testing agency.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An Installer that has been approved by MFMA as an accredited Installer according to the MFMA Accreditation Program.

1. Installer responsibilities include installation and field finishing of wood athletic flooring components and accessories, and application of game lines and markers.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for installation.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver floor assembly materials in unopened cartons or bundles.

B. Protect wood from exposure to moisture. Do not deliver wood components until after concrete, masonry, plaster, ceramic tile, and similar wet-work is complete and dry.

C. Store wood components in a dry, warm, well-ventilated, weathertight location and in a horizontal position.

1.9 FIELD CONDITIONS

A. Conditioning and installation of wood athletic flooring must not begin until HVAC system is operational. HVAC must operate from the start of Conditioning through to the end of construction without gaps.

1. Wood Conditioning: Move wood components into spaces where they will be installed, no later than beginning of the conditioning period.

a. Do not install wood athletic flooring until wood components adjust to relative humidity of, and are at same temperature as, spaces where they are to be installed.
b. Open sealed packages to allow wood components to acclimatize immediately on moving wood components into spaces in which they will be installed.

B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.

C. Install wood athletic flooring after other finishing operations, including painting, have been completed.

1.10 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace wood flooring which fails to perform as required due to material flaws or workmanship within the specified warranty period.

1. Warranty does not include failure due to unusual exposure to moisture or other abusive forces or elements not anticipated for application.

2. Failures include, but are not limited to, the following:

a. Shrinkage
b. Warpage
c. Cracks
d. Excessive deterioration
e. Broken anchorage or bondage

B. Warranty Period: Three (3) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Robbins Sports Surfaces ; Bio-Channel Star or comparable product by one of the following:

1. Action Floor Systems, LLC.
2. Conner Sports Surface Solutions.
3. Or approved equal.

2.2 SYSTEM DESCRIPTION

A. System Type: Floating.

B. Overall System Height: As indicated on Drawings .

2.3 FLOORING MATERIALS

A. Maple Flooring: Comply with MFMA grading rules for species, grade, and cut.

1. Certification: Provide flooring that carries MFMA mark on each bundle or piece.

B. Product Description: 100 percent anchored resilient system, utilizing the following as indicated by manufacturers product designation:

1. Random-Length Strip Flooring: Northern hard maple (Acer saccharum), kiln dried, random length, tongue and groove, and end matched.

a. Grade: MFMA-RL.
b. Cut: As indicated.
c. Thickness: As indicated.
d. Face Width: As indicated.

2. Finger-Jointed Strip Flooring: Northern hard maple (Acer saccharum), kiln dried, random length, tongue and groove, and end matched.

a. Grade: MFMA-FJ First.

1) Exception: For areas under stacked portion of telescoping bleachers that are normally concealed from view, provide Third and Better Grade.

b. Cut: As indicated.
c. Thickness: As indicated.
d. Face Width: As indicated.

2.4 SUBFLOOR MATERIALS

A. Plywood Underlayment: APA rated, C-D plugged, exterior glue, tongue and groove, 15/32 inch thick.

B. Wood Sleepers, where required: Standard grade; 48 inches long; kiln-dried Eastern hemlock, fir, pine, or spruce.

1. Size: Nominal 2 by 3 inches.
2. Asphalt Mastic: ASTM D 312, Type I, cold-applied dead-level asphalt or Type III, hot-applied steep asphalt, as recommended in writing by manufacturer.

C. Channels: Manufacturer's standard as indicated by product designation above.

1. Channel Anchors: Manufacturer's standard, but not less than modified steel drive pins recommended by anchor manufacturer to achieve minimum 900-lbf pullout strength.
2. Clips: Manufacturer's standard as indicated by product designation above.

D. Resilient Pads: Flooring manufacturers standard product,with air voids for resiliency and installed at manufacturer's standard spacing for product designation indicated above.

1. Type: Continuous.
2. Material: PVC, Rubber, or Neoprene.
3. Thickness: 7/16 inch.

E. Resilient Underlayment: Manufacturer standard, flexible, multicellular, closed-cell, expanded polyethylene-foam sheet; nominal 2-lb/cu. ft. density.

2.5 FINISHES

A. Floor-Finish System: System of compatible components recommended in writing by flooring manufacturer, and MFMA approved.

1. Finish-Coat Formulation: Formulated for gloss finish indicated and multicoat application.

a. Type: MFMA Group 3, Gymnasium-Type Surface Finishes.

2. Game-Line and Marker Paint: Industrial enamel compatible with finish coats and recommended in writing by manufacturers of finish coats, and paint for this use.

2.6 ACCESSORIES

A. Wall Base: Vented: rubber; product as indicated on Finish Schedule.

B. Thresholds: As specified in Section 087100 "Door Hardware."

C. Fasteners: Type and size recommended by manufacturer, but not less than those recommended by MFMA for application indicated.

D. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood athletic flooring manufacturer.

E. Adhesives: Manufacturer's standard for application indicated.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Concrete Slabs: Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. , and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
c. Perform additional moisture tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

3.3 PREPARATION

A. Concrete Slabs:

1. Grind high spots and fill low spots on concrete substrates to produce a maximum 1/8-inch deviation in any direction when checked with a 10-foot straight edge.
2. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

B. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.4 INSTALLATION

A. Comply with wood athletic flooring manufacturer's written instructions, but not less than written recommendations of MFMA applicable to flooring type indicated.

B. Pattern: Lay flooring parallel with long dimension of space to be floored unless otherwise indicated.

C. Expansion Spaces: Provide as indicated, but not less than that required by manufacturer's written instructions and MFMA's written recommendations at walls and other obstructions, and at interruptions and terminations of flooring.

1. Cover expansion spaces with base molding, trim, and saddles, as indicated on Drawings.

D. Underlayment: Install perpendicular to direction of flooring, staggering end joints in adjacent rows.

E. Sleepers:

1. Install sleepers perpendicular to direction of flooring, staggering end joints a minimum of 24 inches.
2. Space at spacing recommended by manufacturer for system components indicated.
3. Anchor predrilled sleepers through resilient pads.

F. Channels: Anchor channels to substrate according to manufacturer's written instructions.

1. Install wood strip flooring across channels.
2. Insert steel clip at each intersection of a flooring strip with a channel.

G. Installation Tolerances: 1/8 inch in 10 feet of variance from level.

3.5 SANDING AND FINISHING

A. Allow installed flooring to acclimate to ambient conditions before sanding.

B. Follow applicable recommendations in MFMA's "Industry Recommendations for Sanding, Sealing, Court Lining, Finishing, and Resurfacing of Maple Gym Floors."

C. Machine sand with coarse, medium, and fine grades of sandpaper to achieve a level, smooth, uniform surface without ridges or cups. Remove sanding dust by tack or vacuum.

D. Finish: Apply seal and finish coats of finish system according to finish manufacturer's written instructions. Provide no fewer than four coats total and no fewer than two finish coats.

1. Use product and finishing procedure recommended by finish manufacturer to reduce grain raise and prevent sidebonding effect.

3.6 PROTECTION

A. Protect wood athletic flooring during remainder of construction period to allow finish to cure and to ensure that flooring and finish are without damage or deterioration at time of Substantial Completion.

1. Do not cover flooring after finishing until finish reaches full cure and not before seven days after applying last finish coat.
2. Do not move heavy and sharp objects directly over flooring. Protect fully cured floor finishes and surfaces with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096466

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Thermoset-rubber base.
2. Thermoplastic-rubber base.

B. Related Requirements:

1. Section 096466 - "Wood Athletic Flooring."

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Product Data: For sealants, indicating VOC content.
4. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
5. Laboratory Test Reports: For resilient base products and accessories, indicating compliance with requirements for low-emitting materials.
6. Environmental Product Declaration: For each product.

C. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

D. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 THERMOSET-RUBBER BASE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Johnsonite; A Tarkett Company; Resilient Vent Cove Wall Base or comparable product by one of the following:

1. Burke Mercer Flooring Products; a division of Burke Industries Inc.
2. Flexco.
3. Roppe Corporation, USA.
4. Or approved equal.

B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).

1. Style and Location:

   a. Style B, Cove.

C. Thickness: 0.260 inch.

D. Height: As indicated on Drawings.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Preformed.

G. Inside Corners: Job formed or preformed.

H. Colors: As indicated by manufacturer's designations.

2.3 THERMOPLASTIC-RUBBER BASE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Johnsonite; A Tarkett Company; Johnsonite Millwork series or comparable product by one of the following::

1. Armstrong World Industries, Inc.
2. Burke Mercer Flooring Products; a division of Burke Industries Inc.
3. Roppe Corporation, USA.
4. Or approved equal.

B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location:

   a. Style A, Straight.

C. Thickness: 0.375 inch.

D. Height: As indicated on Drawings.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Preformed.

G. Inside Corners: Job formed.

H. Colors: As indicated by manufacturer's designations.

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.3 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. , and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.4 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Miter or cope corners to minimize open joints.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Rubber floor tile.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Product Data: For chemical-bonding compounds, indicating VOC content.
4. Laboratory Test Reports: For chemical-bonding compounds, indicating compliance with requirements for low-emitting materials.
5. Product Data: For sealants, indicating VOC content.
6. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
7. Laboratory Test Reports: For flooring products, indicating compliance with requirements for low-emitting materials.
8. Environmental Product Declaration: For each product.
9. Health Product Declaration: For each product.

C. Samples: Full-size units of each color, texture, and pattern of floor tile required.

1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 RUBBER FLOOR TILE

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Architecture Drawings by Mondo or comparable product by one of the following:

1. American Biltrite.
2. Nora Systems, Inc.
3. R.C.A. Rubber Company (The).
4. Or approved equal.

B. Product Description: Prefabricated resilient rubber flooring, calendered and vulcanized with a base of synthetic rubber, stabilizing agents and pigmentation.

C. Tile Standard: ASTM F 1344, .

D. Hardness: Grade 1, minimum hardness of 85, measured using Shore, Type A durometer according to ASTM D 2240.

E. Wearing Surface: Smooth.

F. Surface Treatment: Factory applied low-gloss surface treatment, cured by ultraviolet (UV) processing.

G. Thickness: 0.118 inch .

H. Size: 24 by 24 inches.

I. Colorss: Standard, solid background colors with randomly dispersed colored granules throughout the wear layer's entire depth.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. , and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

   a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
   b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

E. Do not install floor tiles until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

F. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.4 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles in pattern indicated.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles in pattern of colors and sizes indicated.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096543 - LINOLEUM FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Linoleum floor tile.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Laboratory Test Reports: For flooring products, indicating compliance with requirements for low-emitting materials.
4. Environmental Product Declaration: For each product.
5. Health Product Declaration: For each product.

C. Samples: For each exposed product and for each color and pattern specified in manufacturer's standard size, but not less than 6-by-9-inch sections.

1. Heat-Welding Bead: Include manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.

D. Heat-Welded Seam Samples: For each linoleum flooring product and welding bead color and pattern combination required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to rigid backing and prepared by Installer for this Project.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Coordinate mockups in this Section with mockups specified in other Sections.

a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Commissioner.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 65 deg F or more than 90 deg F.

1. Floor Tile: Store on flat surfaces.
2. Sheet Flooring: Store rolls upright.

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive flooring during the following periods:

1. 72 hours before installation.
2. During installation.
3. 72 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during flooring installation.

D. Close spaces to traffic for 72 hours after flooring installation.

E. Install flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For linoleum flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Static-Control Properties: As determined by testing identical products in accordance with test method indicated by an independent testing and inspecting agency.

1. Electrical Resistance: Static dissipative ($\leq 1x10^9\ \Omega$) in accordance with EN 1081
2. Static coefficient of friction (ASTM D2047): $\geq$ 0.5 SCOF.

2.2 LINOLEUM FLOOR TILE

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Johnsonite; A Tarkett Company or comparable product by one of the following:

1. Armstrong World Industries, Inc.
2. Forbo Industries, Inc.
3. Or approved equal.

B. Product Description: Homogeneous linoleum floor covering, single layer on jute backing with surface protection, consisting of an homogeneous layer of oxidized linseed oil and natural resins mixed with wood or cork flour, limestone and pigments affixed to a jute backing.

C. Linoleum Floor Tile: ASTM F 2034, Type I, for linoleum floor overing

1. Nominal Floor Tile Size: As indicated on drawings.

D. Thickness: 0.098 inch (2.5 mm).

E. Colors and Patterns: As indicated by manufacturer's designations .

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by linoleum flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by flooring and adhesive manufacturers to suit products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of flooring.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Prepare substrates according to linoleum flooring manufacturer's written instructions to ensure adhesion of flooring.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by linoleum flooring manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by linoleum flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. , and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install flooring until materials are the same temperature as space where they are to be installed.

1. At least 72 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by flooring.

3.4 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions for installing flooring.

B. Scribe and cut flooring to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, thresholds, door frames, and nosings.

C. Extend flooring into toe spaces, door reveals, closets, and similar openings.

D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on flooring as marked on substrates. Use chalk or other nonpermanent marking device.

E. Install flooring on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of flooring installed on covers and adjoining flooring. Tightly adhere flooring edges to substrates that abut covers and to cover perimeters.

F. Adhere flooring to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

G. Heat-Welded Seams: For seamless installation, comply with ASTM F 1516. Rout joints and heat weld with welding bead to fuse sections permanently into a seamless flooring installation. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.

3.5 LINOLEUM FLOOR TILE INSTALLATION

A. Lay out linoleum floor tiles from center marks established with principal walls, discounting minor offsets, so floor tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

B. Match linoleum floor tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed floor tiles.

3.6 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting linoleum flooring.

B. Perform the following operations immediately after completing linoleum flooring installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect linoleum flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. After allowing drying room film (yellow film caused by linseed oil oxidation) to disappear, cover linoleum flooring until Substantial Completion.

END OF SECTION 096543

SECTION 096566 - RESILIENT ATHLETIC FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Rubber sheet flooring.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Product Data: For paints and coatings, indicating VOC content.
4. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-emitting materials.
5. Laboratory Test Reports: For flooring products, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: Show installation details and locations of the following:

1. Seam locations for sheet flooring.

D. Samples for Verification: For each type, color, and pattern of flooring indicated, 6-inch- square Samples of same thickness and material indicated for the Work.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For flooring to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Sheet Vinyl Flooring Installer Qualifications: An experienced Installer who has completed sheet vinyl flooring installations using seaming methods indicated for this Project and similar in material, design, and extent to that indicated for this Project; and whose work has resulted in installations with a record of successful in-service performance.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storing.

B. Store materials to prevent deterioration. Store rolls upright.

1.8 FIELD CONDITIONS

A. Adhesively Applied Products:

1. Maintain temperatures during installation within range recommended in writing by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive flooring 48 hours before installation, during installation, and 48 hours after installation unless longer period is recommended in writing by manufacturer.
2. After postinstallation period, maintain temperatures within range recommended in writing by manufacturer, but not less than 55 deg F or more than 95 deg F.
3. Close spaces to traffic during flooring installation.
4. Close spaces to traffic for 48 hours after flooring installation unless manufacturer recommends longer period in writing.

B. Install flooring after other finishing operations, including painting, have been completed.

1.9 COORDINATION

A. Coordinate layout and installation of flooring with floor inserts for gymnasium equipment.

PART 2 - PRODUCTS

2.1 RUBBER SHEET FLOORING

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Robbins Sports Surfaces and Regupol or comparable product by one of the following:

1. Action Floor Systems, LLC.
2. Johnsonite; a Tarkett company.
3. Mondo America Inc.

4. Roppe Corporation.
5. Or approved equal.

B. Description: Rubber athletic flooring provided as rolled goods for adhered installation.

C. Materials: As indicated by manufacturer's designations.

D. Traffic-Surface Texture: Smooth.

E. Roll Size: Not less than 48 inches wide by longest length that is practical to minimize splicing during installation.

F. Thickness: 1/4 inch 3/8 inch.

G. Color and Pattern: As indicated by manufacturer's designations.

2.2 ACCESSORIES

A. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by flooring manufacturer.

B. Adhesives: Water-resistant type recommended in writing by manufacturer for substrate and conditions indicated.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of flooring.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Alkalinity Testing: Perform pH testing according to ASTM F 710. Proceed with installation only if pH readings are not less than 7.0 and not greater than 8.5.
3. Moisture Testing:

   a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

      1) Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than two tests in each installation area and with test areas evenly spaced in installation areas.

   b. Perform relative humidity test using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by manufacturer. Do not use solvents.

D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

E. Move flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation unless manufacturer recommends a longer period in writing.

   1. Do not install flooring until they are same temperature as space where they are to be installed.

F. Sweep and vacuum clean substrates to be covered by flooring immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust.

G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.4 FLOORING INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions.

B. Scribe, cut, and fit flooring to butt neatly and tightly to vertical surfaces, equipment anchors, floor outlets, and other interruptions of floor surface.

C. Extend flooring into toe spaces, door reveals, closets, and similar openings unless otherwise indicated.

D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating subfloor markings on flooring. Use nonpermanent, nonstaining marking device.

3.5 SHEET FLOORING INSTALLATION

A. Unroll sheet flooring and allow it to stabilize before cutting and fitting.

B. Lay out sheet flooring as follows:

   1. Maintain uniformity of flooring direction.

2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
3. Match edges of flooring for color shading at seams.
4. Locate seams per approved Shop Drawings.

C. Adhered Flooring: Adhere products to substrates using a full spread of adhesive applied to substrate to comply with adhesive and flooring manufacturers' written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.

1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.6 CLEANING AND PROTECTING

A. Perform the following operations immediately after completing flooring installation:

1. Remove adhesive and other blemishes from flooring surfaces.
2. Sweep and vacuum flooring thoroughly.
3. Damp-mop flooring to remove marks and soil after time period recommended in writing by manufacturer.

B. Protect flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

1. Do not move heavy and sharp objects directly over flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096566

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Carpet tile.

B. Related Requirements:

1. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:

a. Review delivery, storage, and handling procedures.
b. Review ambient conditions and ventilation procedures.
c. Review subfloor preparation procedures.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation recommendations for each type of substrate.

B. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of carpet tile.

1. Include Samples of exposed edge, transition, and other accessory stripping involving color or finish selection.

C. Samples for Verification: Actual sample of finished products for each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- long Samples.

D. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Environmental Product Declaration: For each product.
3. Health Product Declaration (HPD): For each product.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockups as indicated on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.10 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended in writing by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, the following:

a. More than 10 percent loss of face fiber, edge raveling, snags, and runs.
b. Loss of tuft-bind strength.
c. Excess static discharge.
d. Delamination.
e. Dimensional instability.

3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Shaw Industries Group, Inc.; Berkshire Hathaway Company or comparable product by one of the following:

1. Interface, Inc.
2. Mohawk Carpet, LLC; The Mohawk Group.
3. Or approved equal.

B. Color: As selected by Commissioner from manufacturer's full range.

C. Pattern: Match Commissioner's samples.

D. Product Characteristics: As indicated by manufacturers product designation.

E. Fiber Content: 100 percent nylon 6,6 unless otherwise indicated.

F. Size: 24 by 24 inches.

G. Applied Treatments:

1. Soil-Resistance Treatment: Manufacturer's standard treatment.

2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles as follows:

   a. Antimicrobial Activity: Not less than 2 mm halo of inhibition for gram-positive bacteria, not less than 1 mm halo of inhibition for gram-negative bacteria, and no fungal growth, in accordance with AATCC 174.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended in writing by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive types to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and that are recommended in writing by carpet tile manufacturer for releasable installation.

C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.

B. Examine carpet tile for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.

   1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

      a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
      b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
      c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

D. Wood Subfloors: Verify the following:

   1. Underlayment over subfloor complies with requirements specified in Section 061600 "Sheathing."

2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. General: Comply with CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates.

B. Use trowelable leveling and patching compounds, in accordance with manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

C. Concrete Substrate: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.4 INSTALLATION

A. General: Comply with CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye-lot integrity. Do not mix dye lots in same area.

D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

H. Access Flooring: Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.5 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive and other surface blemishes using cleaner recommended in writing by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.

3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 13.7.

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 097200 - WALL COVERINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Cork wall covering.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data on physical characteristics, durability, fade resistance, and fire-test-response characteristics.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Laboratory Test Reports: For wall materials, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: Show location and extent of each wall-covering type. Indicate veneer matching seams and termination points.

D. Samples: For each type of wall covering and for each color, pattern, texture, and finish specified, full width by 36 inches long in size.

E. Product Schedule: For wall coverings. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each wall covering, for tests performed by a qualified testing agency.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for installation.

1. Build mockup for each type of wall covering on each substrate required. Comply with requirements in ASTM F1141 for appearance shading characteristics.
2. Approval of mockup does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockup may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install wall coverings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for occupants after Project completion during the remainder of the construction period.

B. Lighting: Do not install wall covering until lighting that matches conditions intended for occupants after Project completion is provided on the surfaces to receive wall covering.

C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates in accordance with test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

2. Fire-Growth Contribution: No flashover and heat and smoke release when tested in accordance with NFPA 286.

2.2 WALL COVERING

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Carnegie.
2. DesignTex Inc.
3. Maharam.
4. Wolf-Gordon.
5. Or approved equal.

B. Composition: 100 percent natural cork bark and recycled cork granules with laminated, patterned cork veneers and set in a natural or synthetic, flexible resin matrix; homogeneous and uniform in composition throughout thickness.

C. Nominal Density: Manufacturer's standard.

D. Nominal Thickness: 0.50 inch.

E. Color: Light natura lunless otherwise indicated.

F. Pattern: As indicated by manufacturer's designations.

G. Factory Finish: Sanded or unfinished.

H. Test Responses:

1. Colorfastness to Light, where applicable to product: Complies with AATCC 16.2 Test Option 1 or AATCC 16.3 Test Option 3, Class L4, minimum, at 40 hours.
2. Mildew Resistance: Rating, where applicable to product of zero or 1 when tested in accordance with ASTM G21.

2.3 ACCESSORIES

A. Adhesive: Mildew-resistant, nonstaining adhesive, for use with specific wall covering and substrate application indicated and as recommended in writing by wall-covering manufacturer.

B. Primer/Sealer: Mildew resistant, complying with and recommended in writing by primer/sealer and wall-covering manufacturers for intended substrate.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrate and conditions, with Installer present, for compliance with requirements for installation surfaces being true in plane and vertical and horizontal alignment, maximum moisture content, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation.

B. Clean substrate of substances that could impair bond of wall covering, including dirt, oil, grease, mold, and mildew.

C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.

1. Gypsum Board: Apply primer/sealer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.

D. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.4 INSTALLATION OF WALL COVERING

A. Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated.

B. Install wall covering without lifted or curling edges and without visible shrinkage.

C. Install seams vertical and plumb at least 6 inches from outside corners and 6 inches from inside corners unless a change of pattern or color exists at corner. Horizontal seams are not permitted.

D. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without overlaps or gaps between strips.

E. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

3.5 CLEANING

A. Remove excess adhesive at seams, perimeter edges, and adjacent surfaces.

B. Use cleaning methods recommended in writing by wall-covering manufacturer.

C. Replace strips that cannot be cleaned.

D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION 097200

SECTION 097723 - FABRIC-WRAPPED PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes:

1. Shop-fabricated, fabric-wrapped wall panels.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include fabric facing, panel edge, core material, and mounting indicated.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Product Data: For installation adhesives, indicating VOC content.
4. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.
5. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
6. Laboratory Test Reports: For wall materials, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For panel assembly and installation.

1. Include plans, elevations, sections, and mounting devices and details.

2. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
3. Include details at cutouts and penetrations for other work.
4. Include direction of fabric weave and pattern matching.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of panel.

B. Sample Warranty: For manufacturer's special warranty.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.

1. Build mockup of typical wall area 48 inches wide by full height. Include intersection of wall and ceiling, corners, and perimeters.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with fabric and panel manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.

B. Deliver materials and panels in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install panels until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Lighting: Do not install panels until a lighting level of not less than 50 fc is provided on surfaces to receive the panels.

C. Air-Quality Limitations: Protect panels from exposure to airborne odors such as tobacco smoke, and install panels under conditions free from odor contamination of ambient air.

D. Field Measurements: Verify panel locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.10 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace panels and components that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Fabric sagging, distorting, or releasing from panel edge.
b. Warping of core.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: Panels must comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and qualified inspecting agency:

1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

2. Fire Growth Contribution: Comply with acceptance criteria of 2022 NYC BC, when tested according to NFPA 265 Method B Protocol or NFPA 286.

2.2 FABRIC-WRAPPED WALL PANELS

A. Fabric-Wrapped Wall Panel : Manufacturer's standard panel construction consisting of facing material stretched over front face of edge-framed core and bonded or attached to edges and back of frame.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Acoustical Solutions, Inc. or comparable product by one of the following:

a. Armstrong World Industries.
b. Conwed.
c. Decoustics Limited; a Saint Gobain company.
d. Or approved equal.

2. Panel Shape: As indicated on Drawings.
3. Mounting:

a. Back mounted with metal Z-clips or bar hangers, secured to substrate.

b. Core-Face Layer: Manufacturer's standard impact-resistant, copolymer sheet.

4. Core Overlay: Polyester batting manufacturer's standard thickness.
5. Edge Construction: Manufacturer's standard chemically hardened core with no frame extruded-aluminum or zinc-coated, rolled-steel frame extruded PVC frame wood frame, rabbeted, and splined with glued joints and machined corners.
6. Edge Profile: Eased (small radius) Square.
7. Corner Detail in Elevation: Square with continuous edge profile indicated.
8. Reveals between Panels: Flush reveals as indicated on Drawings.
9. Facing Material: As indicated on Drawings.
10. Nominal Overall Panel Thickness: As indicated on Drawings.
11. Panel Width: As indicated on Drawings.
12. Panel Height: As indicated on Drawings.

2.3 MATERIALS

A. Core Materials: Manufacturer's standard.

1. Mineral-Fiber Board: Maximum flame-spread and smoke-developed indexes of 25 and 10, respectively; minimum density of 13 lb/cu. ft.
2. Medium-Density Fiberboard: Panels complying with ANSI A208.2, Grade 130.

   a. Fire-retardant panels made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84 or UL 723.

3. Impact-Resistant, High-Density Board for Face Layer: 1/8-inch- thick layer of compressed, molded glass-fiber board with a nominal density of 16 to 18 lb/cu. ft. laminated to face of core.
4. Wood and Plywood: Manufacturer's standard plywood or clear, vertical grain, straight, kiln-dried hardwood.

   a. Fire-retardant treated by pressure process with a flame-spread index of 25 or less when tested according to ASTM E 84 or UL 723, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

      1) Treated material are to have a moisture content of 28 percent or less when tested according to ASTM D 3201/D 3201M at 92 percent relative humidity.
      2) Kiln-dry material after treatment to 19 percent for lumber and 15 percent or less for plywood.

B. Facing Material: Fabric from same dye lot; color and pattern as selected by Commissioner from manufacturer's full range.

1. Color:As indicated or selected by Commissioner .
2. Fiber Content: 100 percent woven polyesteror polyolefin.
3. Applied Treatments: Stain resistance flame-retardant.
4. Lining Material, when required by project application: Manufacturer's standard fabric for each use indicated.

C. Mounting Devices: Concealed on back of panel, recommended by manufacturer to support weight of panel, and as follows:

1. Metal Clips or Bar Hangers: Manufacturer's standard two-part metal "Z" clips, with one part of each clip mechanically attached to back of panel and the other part to substrate, designed to permit unit removal.

2.4 FABRICATION

A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.

B. Edge Hardening: For mineral-fiber board cores, chemically harden core edges and areas of core where mounting devices are attached.

C. Core-Face Layer and Core Overlay: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, or sags.

D. Facing Material and Lining Material: Apply fabric fully covering visible surfaces of panel; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.

1. Square Corners: Tailor corners. Heat-seal vinyl fabric seams at corners.
2. Radius and Other Nonsquare Corners: Attach material so there are no seams or gathering of material.
3. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent panels.

E. Dimensional Tolerances of Finished Panels: Plus or minus 1/16 inch for the following:

1. Thickness.
2. Edge straightness.
3. Overall length and width.
4. Squareness from corner to corner.
5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine fabric, fabricated panels, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting panel performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install panels in locations indicated. Unless otherwise indicated, install panels with vertical surfaces and edges plumb, top edges level and in alignment with other panels, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.

B. Comply with manufacturer's written instructions for installation of panels using type of mounting devices indicated. Mount panels securely to supporting substrate.

C. Align fabric pattern and grain as indicated on Drawings.

3.4 INSTALLATION TOLERANCES

A. Variation from Plumb and Level: Plus or minus 1/16 inch in 48 inches , noncumulative.

B. Variation of Joint Width: Not more than 1/16 inch wide from hairline in 48 inches , noncumulative.

3.5 CLEANING

A. Clip loose threads; remove pills and extraneous materials.

B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 097723

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Primers.
2. Water-based finish coatings.
3. Floor sealers and paints.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Samples: For each type of topcoat product.

C. Product Schedule: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Commissioner will select one surface to represent surfaces and conditions for application of each paint system.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.

b. Other Items: Commissioner will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Commissioner at no added cost to City of New York.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Benjamin Moore & Co. or comparable product by one of the following

1. Behr Paint Company; Behr Process Corporation.
2. PPG Paints.
3. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
4. Sherwin-Williams Company (The).
5. Or approved equal.

2.2 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system must be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2. For each coat in a paint system, products must be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. Colors: As selected by Commissioner from manufacturer's full range unless otherwise indicated in a color schedule.

1. Ten percent of surface area will be painted with deep tones.

2.3 PRIMERS

A. Interior/Exterior Latex Block Filler: Water-based, high-solids, emulsion coating formulated to bridge and fill porous surfaces of exterior concrete masonry units in preparation for specified subsequent coatings.

B. Interior, Institutional Low-Odor/VOC Primer Sealer: Water-based primer sealer with low-odor characteristics and a VOC of less than 10 grams per liter for use on new interior plaster, concrete, and gypsum wallboard surfaces that are subsequently to be painted with latex finish coats.

C. Interior Latex Primer for Wood: Waterborne-emulsion primer formulated for resistance to extractive bleeding, mold, and microbials; for hiding stains; and for use on interior wood subject to extractive bleeding.

D. Water-Based Rust-Inhibitive Primer: Corrosion-resistant, water-based-emulsion primer formulated for resistance to flash rusting when applied to cleaned, interior ferrous metals subject to mildly corrosive environments.

2.4 WATER-BASED FINISH COATS

A. Interior, Latex, High-Performance Architectural Coating, Low Sheen: High-performance architectural latex coating providing a significantly higher level of performance than conventional latex paints in the areas of scrub resistance, burnish resistance, and ease of stain removal.

B. Interior, Latex, High-Performance Architectural Coating, Eggshell: High-performance architectural latex coating providing a significantly higher level of performance than conventional latex paints in the areas of scrub resistance, burnish resistance, and ease of stain removal.

C. Interior, Latex, High-Performance Architectural Coating, Satin: High-performance architectural latex coating providing a significantly higher level of performance than conventional latex paints in the areas of scrub resistance, burnish resistance, and ease of stain removal.

D. Interior, Latex, High-Performance Architectural Coating, Semigloss: High-performance architectural latex coating providing a significantly higher level of performance than conventional latex paints in the areas of scrub resistance, burnish resistance, and ease of stain removal.

2.5 FLOOR SEALERS AND PAINTS

A. Latex Floor Paint, Low Gloss: Water-based, pigmented coating formulated to hide stains, for alkali and incidental water resistance, and for use on concrete and primed-wood surfaces subject to low to medium foot traffic.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Fiber-Cement Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.3 PREPARATION

A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.4 INSTALLATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

   a. Equipment, including panelboards and switch gear.
   b. Uninsulated metal piping.
   c. Uninsulated plastic piping.
   d. Pipe hangers and supports.
   e. Metal conduit.
   f. Tanks that do not have factory-applied final finishes.
   g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. Paint the following work where exposed in occupied spaces:

   a. Equipment, including panelboards.
   b. Uninsulated metal piping.
   c. Uninsulated plastic piping.
   d. Pipe hangers and supports.
   e. Metal conduit.
   f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
   g. Other items as directed by Commissioner.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements
3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Commissioner, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 099123

SECTION 099611 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes surface preparation and application of high-performance coating systems on the following substrates:

1. Exterior Substrates:

a. Clay masonry.

B. Related Requirements:

1. Section 042000 "Unit Masonry" for additional information on brick facade mockups.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Indicate VOC content.

B. Sustainable Design Submittals:

1. Product Data: For paints and coatings, indicating VOC content.
2. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-emitting materials.
3. Environmental Product Declaration (EPD): For each product.

C. Samples for Initial Selection: For each type of topcoat product indicated.

D. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.

1. Submit Samples on actual substrate material to be coated, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.

4. Label each Sample for location and application area.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Commissioner will select surface(s) to represent surfaces and conditions for application of each coating system.

a. Provide mockups each of at least two (2) different anti-graffiti coatings that comply with Part 2 of this section to account for the natural variability that may occur between protective coatings and natural brick.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Commissioner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the following:

1. ProSoCo, Inc: Block Guard.
2. ProSoCo, Inc.; Defacer Eraser SC-1 Sacrificial Coating.
3. Visual Pollution Tech, Inc.; Graffiti-Pruf.
4. Diedrich Technologies, Inc.; Omegaseal 333-L
5. Or approved equal.

2.2 HIGH-PERFORMANCE COATINGS

A. Material Compatibility:

1. Materials for use within each paint system must be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products must be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. Products must be of same manufacturer for each coat in a coating system.

2.3 GRAFFITI-RESISTANT COATINGS

A. Product Description: Polyurethane, Water based, anti-graffit or Polyurethane, water based, anti-graffiti; complying with MPI #105.

B. Comply with product manufacturers performance requirements for moderate exposure.

C. Product Characteristics:

1. Percentage of solids by volume: Manufacturers standard.
2. Dry film thickness: Manufacturers standard.

D. Top Coat: One.

E. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.3 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and coating systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted.

1. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
2. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed.
3. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

3.4 APPLICATION

A. Apply high-performance coatings in accordance with manufacturer's written instructions.

1. Use applicators and techniques suited for coating and substrate indicated.
2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.5 CLEANING AND PROTECTION

A. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

B. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Commissioner, and leave in an undamaged condition.

C. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

END OF SECTION 099611

SECTION 101419 - DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Dimensional Characters:

   a. Cutout dimensional characters.
   b. Exterior, fabricated channel dimensional characters.

1.3 COORDINATION

A. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.
4. Show locations of electrical service connections.
5. Include diagrams for power, signal, and control wiring.

D. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

E. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Dimensional Characters: Half-size Sample of each type of dimensional character.
2. Exposed Accessories: Full-size Sample of each accessory type.
3. Full-size Samples, if approved, will be returned to Contractor for use in the Project.

F. Product Schedule: For dimensional letter signs. Use same designations indicated on Drawings or specified.

G. Engineering Services Submittal: For signs indicated in "Performance Requirements" Article.

1. Include structural analysis calculations for signs indicated to comply with design loads; signed and sealed by the qualified professional engineer, licensed in the State of New York, responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 FIELD CONDITIONS

A. Field Measurements: Verify locations of electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.9 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering.
b. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design sign structure and anchorage of dimensional character sign type(s) according to structural performance requirements.

B. Structural Performance: Signs and supporting elements must withstand the effects of gravity and other loads within limits and under conditions indicated.

1. Uniform Wind Load: As indicated on Drawings.
2. Concentrated Horizontal Load: As indicated on Drawings.
3. Uniform and concentrated loads need not be assumed to act concurrently.

C. Thermal Movements: For exterior fabricated channel dimensional characters, allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 DIMENSIONAL CHARACTERS

A. Cutout Symbols : Characters with uniform faces; square-cut, smooth, eased edges; precisely formed lines and profiles; and as follows:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. A.R.K. Ramos.
b. ACE Sign Systems, Inc.
c. Diskey Architectural Signage Inc.
d. InPro Corporation (IPC).
e. Metal Arts.
f. Southwell Company (The).
g. Or approved equal.

2. Character Material: Plate aluminum.
3. Character Height: As indicated on Drawings.
4. Thickness: Manufacturer's standard for size of character.
5. Finishes:

a. Integral Aluminum Finish: Powdercoat to match color indicated on Drawings.

6. Mounting: As indicated on Drawings.
7. Typeface: Per drawings.

B. Fabricated Channel Characters : Metal face and side returns Open face with metal side returns, formed free from warp and distortion; with uniform faces, sharp corners, and precisely formed lines and profiles; internally braced for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners; and as follows.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. A.R.K. Ramos.
   b. ACE Sign Systems, Inc.
   c. Allen Industries Architectural Signage.
   d. Metallic Arts.
   e. Or approved equal.

2. Character Material: Plate aluminum.
3. Material Thickness: Manufacturer's standard for size and design of character.

4. Character Height: As indicated on Drawings.
5. Character Depth: As indicated on Drawings.
6. Finishes:

   a. Integral Aluminum Finish: Powdercoat to match color indicated on Drawings.

2.3 DIMENSIONAL CHARACTER MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.

B. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

D. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 316, stretcher-leveled standard of flatness.

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
3. Exposed Metal-Fastener Components, General:

   a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
   b. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant slots unless otherwise indicated.

4. Sign Mounting Fasteners:

   a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
5. Internally brace dimensional characters for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
6. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.

1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish to match sign-background color color unless otherwise indicated.
2. Stainless-Steel Brackets: Factory finish brackets with No. 4 finish unless otherwise indicated.

2.6 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.7 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Verify that electrical service is correctly sized and located to accommodate signs.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF DIMENSIONAL CHARACTERS

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.4 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Commissioner.

END OF SECTION 101419

SECTION 101423 - PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes:

1. Interior, room-identification signs that are directly attached to the building.
2. Field-applied, vinyl-character signs used for building address and distraction banding.

1.3 DEFINITIONS

A. Accessible: In accordance with the accessibility standard.

1.4 COORDINATION

A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

B. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For room-identification signs.

1. Include fabrication and installation details and attachments to other work.

2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.

D. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

E. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Room-Identification Signs: Full-size Sample.
2. Variable Component Materials: Full-size Sample of each base material, character (letter, number, and graphic element) in each exposed color and finish not included in Samples above.
3. Exposed Accessories: Half-size Sample of each accessory type.
4. Full-size Samples, if approved, will be returned to Contractor for use in Project.

F. Product Schedule: For room-identification signs. Use same designations indicated on Drawings or specified.

1.7 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 FIELD CONDITIONS

A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.10 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering.
b. Deterioration of embedded graphic image.
c. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1-2009.

2.2 ROOM-IDENTIFICATION SIGNS

A. Room-Identification Sign : Sign system with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Allen Industries Architectural Signage.
   b. Best Sign Systems, Inc.
   c. InPro Corporation (IPC).
   d. Mohawk Sign Systems.
   e. Nelson-Harkins Industries.
   f. Or approved equal.

2. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated over subsurface graphics to acrylic or phenolic backing sheet to produce composite sheet.

   a. Composite-Sheet Thickness: Manufacturer's standard for size of sign.
   b. Surface-Applied Graphics: Applied vinyl film or paint.
   c. Subsurface Graphics: Reverse halftone or dot-screen image.
   d. Color(s): As selected by Commissioner from manufacturer's full range.

3. Sign-Panel Perimeter: Finish edges smooth.

   a. Edge Condition: Beveled.
   b. Corner Condition in Elevation: Square.

4. Mounting: Manufacturer's standard method for substrates indicated with concealed anchors.
5. Text and Typeface: Accessible raised characters and Braille; typeface as indicated or selected by Commissioner from manufacturer's full range. Finish raised characters to contrast with background color, and finish Braille to match background color.

2.3 FIELD-APPLIED, VINYL-CHARACTER SIGNS

A. Field-Applied, Vinyl-Character Sign : Prespaced characters die cut from 3- to 3.5-mil thick, weather-resistant vinyl film with release liner on the back and carrier film on the front for on-site alignment and application.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. APCO Graphics, Inc.

2. Allen Markings.
3. Mohawk Sign Systems.
4. inpro Corporation.
5. Or approved equal

C. Size: As indicated on Drawings.

D. Substrate: As indicated on Drawings.

E. Text and Font: As indicated on Drawings.

2.4 SIGN MATERIALS

A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

C. Vinyl Film: UV-resistant vinyl film with pressure-sensitive, permanent adhesive; die cut to form characters or images as indicated on Drawings and suitable for exterior applications.

D. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.5 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
3. Exposed Metal-Fastener Components, General:

a. Fabricated from same basic metal and finish of fastened sign unless otherwise indicated.
b. Fastener Heads: Use flathead or oval countersunk screws and bolts with tamper-resistant spanner-head slots unless otherwise indicated.

4. Sign Mounting Fasteners:

a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly unless otherwise indicated.
b. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, and installed in predrilled holes.

B. Adhesive: As recommended by sign manufacturer.

C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.

D. Hook-and-Loop Tape: Manufacturer's standard two-part tape consisting of hooked part on sign back and looped side on mounting surface.

E. Magnetic Tape: Manufacturer's standard magnetic tape with adhesive on one side.

2.6 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
4. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

B. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image must be free of rough edges.

C. Subsurface-Etched Graphics: Reverse etch back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.

2.7 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, Class II, 0.010 mm or thicker.

B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Accessibility: Install signs in locations on walls as indicated on Drawings and according to the accessibility standard.

C. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

2. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
3. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
4. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

5. Hook-and-Loop Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply sign component of two-part tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage; push to engage tape adhesive. Keep tape strips 0.250 inch away from edges to prevent visibility at sign edges when sign is initially installed or reinstalled. Apply substrate component of tape to substrate in locations aligning with tape on back of sign; push and rub well to fully engage tape adhesive to substrate.
6. Magnetic Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by the Commissioner.

END OF SECTION 101423.16

SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Solid-plastic toilet compartments.

B. Related Requirements:

1. Section 092216 "Non-Structural Metal Framing" for blocking.
2. Section 102813 "Toilet Accessories" for accessories mounted on toilet compartments.

1.3 COORDINATION

A. Coordinate requirements for blocking, reinforcing, and other supports concealed within wall to ensure that toilet compartments can be supported and installed as indicated.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Solid-plastic toilet compartments:

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachment details.
2. Show locations of cutouts for compartment-mounted toilet accessories.
3. Show locations of centerlines of toilet fixtures.
4. Show locations of floor drains.
5. Show overhead support or bracing locations.

C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of toilet compartment.

1. Include Samples of hardware and accessories involving material and color selection.

D. Samples for Verification: Actual sample of finished products for each type of toilet compartment, hardware, and accessory.

1. Size: Manufacturer's standard size.

E. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

F. Engineering Services Submittals: For grab bars mounted on toilet compartment panels, including analysis data signed and sealed by the qualified New York State licensed professional engineer responsible for their preparation.

1. Include structural design calculations indicating compliance with specified structural-performance requirements.

G. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements, and coordinate before fabrication.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain plastic toilet compartments from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire Performance: Tested in accordance with, and pass the acceptance criteria of, NFPA 286.

B. Structural Performance: Where grab bars are mounted on toilet compartments, design panels to comply with the following requirements:

1. Panels are able to withstand a concentrated load on grab bar of at least 250 lbf applied at any direction and at any point, without deformation of panel.

C. Regulatory Requirements: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1-2009 for toilet compartments designated as accessible.

2.3 SOLID-PLASTIC TOILET COMPARTMENTS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Scranton Products or comparable product by one of the following:

1. ASI Accurate Partitions.
2. Hadrian Inc.; Zurn Industries, LLC.
3. Metpar Corp.
4. Weis/Robart Partitions, Inc.
5. Or approved equal.

B. Toilet-Enclosure Style: Overhead braced , privacy type.

C. Urinal-Screen Style: Wall hung.

D. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color throughout thickness of material. Provide with no-sightline system consisting of door and pilaster lapped edges on strike side of door and door and pilaster lapped edges on hinge side of door (unless continuous hinge is used).

1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
2. Heat-Sink Strip: Manufacturer's continuous, extruded-aluminum strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
3. Color: One color in each room as selected by Commissioner from manufacturer's full range.

E. Urinal-Screen Construction: Matching panel construction.

F. Pilaster Shoes: Manufacturer's standard design; stainless steel.

G. Pilaster Sleeves (Caps): Manufacturer's standard design; .

1. Plastic Color: Matching pilaster.

H. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's standard design; extruded aluminum stainless steel.

2.4 HARDWARE AND ACCESSORIES

A. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

B. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.5 MATERIALS

A. Aluminum Castings: ASTM B26/B26M.

B. Aluminum Extrusions: ASTM B221.

C. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.

D. Stainless Steel Castings: ASTM A743/A743M.

E. Zamac: ASTM B86, commercial zinc-alloy die castings.

2.6 FABRICATION

A. Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.

B. Overhead-Braced Units: Manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters and walls to suit floor and wall conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

C. Urinal-Screen Posts: Manufacturer's standard corrosion-resistant anchoring assemblies at posts and walls, with leveling adjustment nuts at bottoms of posts. Provide shoes at posts to conceal anchorage.

D. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, inswinging doors for standard toilet enclosures and 36-inch- wide, outswinging doors with a minimum 32-inch- wide, clear opening for toilet enclosures designated as accessible and self-closing hinges as applicable to project application.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.

1. Confirm location and adequacy of blocking and supports required for installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:

a. Pilasters and Panels or Screens: 1/2 inch.
b. Panels or Screens and Walls: 1 inch.

2. Full-Height (Continuous) Brackets: Secure panels or screens to walls and to pilasters with full-height brackets.

a. Locate bracket fasteners, so holes for wall anchors occur in masonry or tile joints.
b. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels and adjust, so tops of doors are parallel with overhead brace when doors are in closed position.

C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.4 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware in accordance with hardware manufacturer's written instructions for proper operation. Set hinges on inswinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on outswinging doors to return doors to fully closed position.

END OF SECTION 102113.19

SECTION 102240 - GLAZED INTERIOR WALL AND DOOR ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Glazed aluminum-framed interior wall and door assemblies (office front and partition system).

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for support material not supplied by product manufacturer.
2. Section 087100 "Door Hardware" for items not provided under this Section.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's descriptive literature for each component in partition assembly
2. Include construction details, dimensions of individual components and profiles, and finishes.

B. Shop Drawings:

1. Include plans, elevations, sections, attachment details.
2. Details of fittings and glazing, including isometric drawings of fittings..
3. Door hardware locations, mounting heights, and installation requirements.
4. Setting Drawings: For embedded items and cutouts required in other work

C. Engineering Services Submittal: For wall and door assembly attachment, design calculations, bearing seal and signature of qualified engineer, licensed in the state of New York, showing loads at points of attachment to the building structure.

D. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of fitting, accessory fitting, glass, and door hardware.

E. Samples for Verification: Actual sample of finished products for each type of fitting, accessory fitting, glass, and door hardware in manufacturers' standard size.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of product used.

B. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

C. Sample warranty.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockup to set quality standards for materials and execution.

1. Build mockup as indicated on Drawings.
2. Approval of mockup does not constitute approval of deviations from the Contract Documents contained in mockup unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until installation.

1.9 WARRANTY

A. Manufacturers standard warranty to repair or replace components of office front and partition system that fail in materials or workmanship.

1. Deterioration of metals, metal finishes, and other materials beyond normal use.

a. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design attachments to structure.

1. Design system to withstand normal operation without damage, racking, sagging, or deflection.

2.2 ALUMINUM-FRAMED GLAZED INTERIOR WALL AND DOOR ASSEMBLIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide ; C.R. Laurence Co., Inc; CRL 487 Series Framed Glass Wall Office System or comparable from one of the following:

1. Avanti Systems, Inc.
2. PRL Glass Inc.
3. Virginia Glass Products Corporation.
4. Or approved equal.

B. Product Description: Center-glazed rectilinear aluminum framing with screw spline or clip joinery.

1. Fitting Configuration: As indicated on drawings.
2. Fitting Material: Aluminum.
3. Fastenings: Concealed, where exposed provide aluminum.
4. Perimeter Anchors: Steel, separated from aluminum framing.
5. Profile Width: 1-1/2 inch.
6. Profile Depth: 5-11/16 inch overall.
7. Profile Face Trim: 1-1/2 inch wide by 3/8 inch deep, snap in place.
8. Wall Construction Width, Throat Size: 4-7/8 inch maximum wall, consisting of metal studs.
9. Frame Finish: Class I natural anodized.

C. Pivoting Glass Doors: Dry glazed patch fittings.

1. Door Configuration: As indicated on drawings.
2. Height: 2 inch.
3. Length: 6-7/16 inch .
4. Door Hardware: Locking ladder pulls, brushed stainless steel tubing.
5. Provide accessories as required for complete installation.

D. Pivoting Glass Doors: Full length dry glazed rail fittings.

1. Door Configuration: As indicated on drawings.
2. Full Length Top and Bottom Rails: 2-5/16 inch high by 1-1/2 inch deep with end caps.
3. Glass Thickness: 1/2 inch (12.7 mm), fully-tempered.
4. Sidelite Rails: Match door rail sightlines and finish.
5. Door Hardware: Refer to Section 087100.
6. Provide accessories as required for complete installation.

E. Door Hardware: In sizes, quantities, and types recommended by manufacturer entrance systems indicated. For exposed parts, match metal and finish of fittings.

1. Coordinate wall and door assembly preparation and provide hardware as necessary for fully operable installation.

2.3 GLASS

A. Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated surfaces), Type I (transparent), Quality-Q3, tested for surface and edge compression in accordance with ASTM C1048 and for impact strength in accordance with 16 CFR 1201 for Category II materials.

1. Class 1: Clear monolithic.
2. Exposed Edges: Machine ground and flat polished.
3. Butt Edges: Flat ground.
4. Corner Edges: Lap-joint corners with exposed edges polished.
5. Thickness: 1/2 inch, fully- tempered.

2.4 MATERIALS

A. Aluminum: ASTM B221 with strength and durability characteristics of not less than Alloy 6063-T5 for extruded bars, rods, profiles, and tubes. ASTM B209 for sheet and plate.

1. Clear Anodic Finish: AAMA 611, AA-M12C22A31, or thicker.

B. Structural Shapes, Plates, and Bars: ASTM A36/A36M.

2.5 FABRICATION

A. Factory assembled to greatest extent practical; may be disassembled to accommodate shipping constraints.

B. Provide wood blocking at sill of glazing frame to match height of floor finish.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine flooring, floor levelness, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable panel partitions.

B. Verify floor flatness of 1/8 inch in 10 feet, non-cumulative.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean substrates thoroughly prior to installation.

B. Prepare substrates using the methods recommended by the manufacturer for achieving acceptable result for the substrate under the project conditions.

3.4 INSTALLATION

A. Install glazed interior wall and door assembly and accessories after other finishing operations, including painting, have been completed in area of partition installation.

B. Install glazed interior wall and door assembly in accordance approved Shop Drawings and manufacturer's instructions.

C. Fit and align glazed interior wall and door assembly level and plumb

D. Damaged glazed interior wall and door assembly s not acceptable.

3.5 ADJUSTING

A. Adjust glazed interior wall and door assembly to operate smoothly from sliding or pivoting positions.

B. Adjust swing door hardware for smooth operation.

3.6 CLEANING AND PROTECTION

A. Clean installed work to like-new condition.

B. Verify that safety devices are properly functioning

3.7 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before date of Substantial Completion. .

END OF SECTION 102239

SECTION 102613 - CORNER GUARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Corner guards.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
2. Include fire ratings of units recessed in fire-rated walls and listings for door-protection items attached to fire-rated doors.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For each type of wall and door protection showing locations and extent.

1. Include plans, elevations, sections, and attachment details.

D. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated, in each color and texture specified.

1. Include Samples of accent strips and accessories to verify color selection.

E. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:

1. Wall Guards: 12 inches long. Include examples of joinery, corners, and field splices.
2. Corner Guards: 12 inches long. Include example top caps.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store wall protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with applicable provisions in Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities ICC A117.1-2009.

2.2 CORNER GUARDS

A. Surface-Mounted, Metal Corner Guards: Fabricated as one piece from formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Construction Specialties, Inc.
b. InPro Corporation (IPC).
c. Korogard Wall Protection Systems; a division of RJF International Corporation.
d. Nystrom, Inc.
e. Or approved equal.

B. Material: Stainless-steel sheet, Type 304.

1. Thickness: Minimum 0.0500 inch.
2. Finish: Directional satin, No. 4.

C. Wing Size: Nominal 1-1/2 by 1-1/2 inches.

D. Corner Radius: 1/8 inch.

E. Mounting: Flat-head, countersunk screws through factory-drilled mounting holes.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

2.4 FABRICATION

A. Fabricate wall protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.

B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

C. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

D. Wood Handrails: Miter corners and ends of wood handrails for returns.

2.5 FINISHES

A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of the Work.

B. Examine walls to which wall and door protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.

1. For wall and door protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Complete finishing operations, including painting, before installing wall and door protection.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.4 INSTALLATION

A. Installation Quality: Install wall protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.

1. Provide anchoring devices and suitable locations to withstand imposed loads.
2. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches apart.
3. Adjust caps as required to ensure tight seams.

C. Fire Doors: Install protection according to the listing of each item.

3.5 CLEANING

A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.

B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102613

SECTION 102813 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Public-use shower room accessories.
3. Childcare accessories.
4. Underlavatory guards.
5. Custodial accessories.

B. Related Requirements:

1. Section 057500 "Decorative Formed Metal" for stainless steel mirrors.
2. Section 088300 "Mirrors" for frameless mirrors.

1.3 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.

3. Include electrical characteristics.

B. Samples: For each exposed product and for each finish specified, full size.

1. Approved full-size Samples will be returned and may be used in the Work.

C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 WARRANTY

A. Manufacturer's Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Warranty for Hand Dryers: Manufacturer agrees to repair or replace hand dryers that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Structural Performance: Design accessories and fasteners to comply with the following requirements:

1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.
2. Shower Seats: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Toilet Tissue (Roll) Dispenser: TA-2 and SA-4:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Bradley Corporation and Vandal Stop Products or comparable product by one of the following:

    a. AJW Architectural Products.
    b. American Specialties, Inc.
    c. Bobrick Washroom Equipment, Inc.
    d. Or approved equal.

2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
3. Mounting: Surface mounted.
4. Operation: Noncontrol delivery with theft-resistant spindle.
5. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

B. Waste Receptacle: TA-4:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Bobrick Washroom Equipment, Inc or comparable product by one of the following:

    a. AJW Architectural Products.
    b. American Specialties, Inc.
    c. Bradley Corporation.
    d. Or approved equal.

2. Mounting: Freestanding.
3. Minimum Capacity: As indicated by selected manufacturers product designation.
4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
5. Liner: Reusable vinyl liner.
6. Lockset: Tumbler type for waste receptacle.

C. Warm-Air Hand Dryer: TA-3:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Excel Dryer Inc. or comparable product by one of the following:

    a. ASI-American Specialties, Inc.
    b. Bobrick Washroom Equipment, Inc.
    c. World Dryer Corporation.
    d. Or approved equal.

2. Description: Standard-speed, warm-air hand dryer.
3. Mounting: Surface mounted.

    a. Protrusion Limit: Installed unit protrudes maximum 4 inches from wall surface.

4. Operation: Infrared-sensor activated with timed power cutoff switch.

    a. Automatic Shutoff: At 40 seconds.

5. Maximum Sound Level: 63 dB.
6. Cover Material and Finish: Steel, with white enamel finish Molded plastic, white.
7. Electrical Requirements: 115 V, 13 A, 1500 W.

D. Soap Dispenser: TA-1:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by American Specialties, Inc. or comparable product by one of the following:

    a. AJW Architectural Products.
    b. Bradley Corporation.
    c. GAMCO Specialty Accessories; a division of Bobrick.
    d. Or approved equal.

2. Description: Designed for manual operation and dispensing soap in liquid or lotion form.
3. Mounting: Vertically oriented, surface mounted.
4. Capacity: As scheduled.

E. Grab Bar: GR-1 thru GR-4:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Bobrick Washroom Equipment, Inc. or comparable product by one of the following:

    a. AJW Architectural Products.
    b. Bradley Corporation.
    c. Tubular Specialties Manufacturing, Inc.
    d. Or approved equal.

2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.

    a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin) on ends and slip-resistant texture in grip area unless otherwise indicated.

4. Outside Diameter: 1-1/2 inches unless otherwise indicated.
5. Configuration and Length: As indicated on Drawings.

F. Mirror Unit: MR-1:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Bobrick Washroom Equipment, Inc. or comparable product by one of the following:

    a. AJW Architectural Products.
    b. American Specialties, Inc.
    c. Bradley Corporation.
    d. Or approved equal.

2. Frame: Stainless steel angle, 0.05 inch thick or Stainless steel channel.

   a. Corners: Manufacturer's standard.

3. Size: As indicated on Drawings.

2.3 PUBLIC-USE SHOWER ROOM ACCESSORIES

A. Shower Curtain Rod: SA-2:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Bobrick Washroom Equipment, Inc. or comparable product by one of the following:

   a. American Specialties, Inc.
   b. GAMCO Specialty Accessories; a division of Bobrick.
   c. Tubular Specialties Manufacturing, Inc.
   d. Or approved equal.

2. Description: 1-1/4-inch- OD, unless otherwise indicated.
3. Configuration: As indicated on Drawings.
4. Mounting Flanges: Concealed fasteners; material and finish matching rod.
5. Rod Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

B. Shower Curtain: SA-3:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Bobrick Washroom Equipment, Inc or comparable product by one of the following:

   a. AJW Architectural Products.
   b. American Specialties, Inc.
   c. Brey-Krause Manufacturing Co.
   d. Or approved equal.

2. Size: Minimum 6 inches wider than opening by 72 inches high.
3. Material: Vinyl, minimum 0.006 inch thick, opaque, matte or Nylon-reinforced vinyl, minimum 9 oz. or 0.008-inch- thick vinyl, with integral antibacterial and flame-retardant agents.
4. Color: As selected from manufacturer's full range.
5. Grommets: Corrosion resistant at minimum 6 inches o.c. through top hem.
6. Shower Curtain Hooks: Chrome-plated or stainless steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.

C. Folding Shower Seat: SA-1:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Bobrick Washroom Equipment, Inc or comparable product by one of the following:

   a. AJW Architectural Products.

b. American Specialties, Inc.
c. Bradley Corporation.
d. Or approved equal.

2. Configuration: Stainless steel seat designed to fold into recessed-mounted, stainless steel wall box.
3. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected by Commissioner Stainless steel, ASTM A480/A480M No. 4 finish (satin); 0.05-inch- minimum nominal thickness; with single-piece, pan-type construction and edge seams welded and ground smooth.
4. Mounting Mechanism: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

2.4 CHILDCARE ACCESSORIES

A. Diaper-Changing Station: TA-5:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Koala Kare Products; a Division of Bobrick or comparable product by one of the following:

a. American Specialties, Inc.
b. Diaper Deck & Company, Inc.
c. Foundations Worldwide, Inc.
d. Or approved equal.

2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.

a. Engineered to support minimum of 250-lb static load when opened.

3. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin), with replaceable insulated polystyrene tray liner and rounded plastic corners or Stainless steel, ASTM A480/A480M No. 4 finish (satin), exterior shell with rounded plastic corners; HDPE interior in manufacturer's standard color.
6. Liner Dispenser: Provide separate, locking dispenser for disposable sanitary liners.

2.5 CUSTODIAL ACCESSORIES

A. Custodial Mop and Broom Holder:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc.
c. Bradley Corporation.
d. Or approved equal.

2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
3. Length: 36 inches.

4. Hooks: Four.
5. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

    a. Shelf: Not less than nominal 0.05-inch- thick stainless steel.
    b. Rod: Approximately 1/4-inch- diameter stainless steel.

2.6 MATERIALS

A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch- minimum nominal thickness unless otherwise indicated.

B. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.

C. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.

D. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.7 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to City of New York.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

    1. Remove temporary labels and protective coatings.

B. Grab Bars: Install to comply with specified structural-performance requirements.

C. Shower Seats: Install to comply with specified structural-performance requirements.

3.3 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Clean and polish exposed surfaces in accordance with manufacturer's written instructions.

END OF SECTION 102813

SECTION 104413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:

a. Portable fire extinguisher.

B. Related Requirements:

1. Section 104416 "Fire Extinguishers" for portable, hand-carried fire extinguishers accommodated by fire-protection cabinets

1.3 PREINSTALLATION CONFERENCE

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to fire-protection cabinets, including, but not limited to, the following:

a. Schedules and coordination requirements.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

B. Shop Drawings: For fire-protection cabinets.

1. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 FIRE-PROTECTION CABINET

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Fire-End & Croker Corporation.
2. Guardian Fire Equipment, Inc.
3. Larsens Manufacturing Company.
4. Potter Roemer LLC; a Division of Morris Group International.
5. Or approved equal.

B. Fire-Protection Cabinet Type: Suitable for fire extinguisher.

C. Cabinet Construction: Nonrated.

D. Cabinet Material: Cold-rolled steel sheet.

E. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).

1. Rolled-Edge Trim: 2-1/2-inch backbend depth.

F. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim.

G. Cabinet Trim Material: Steel sheet.

H. Door Material: Steel sheet.

I. Door Style: Vertical duo panel with frame.

J. Door Glazing: Tempered float glass (clear).

K. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide manufacturer's standard hinge, permitting door to open 180 degrees.

L. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Identification: Lettering complying with Chapter 9 of the NYC Building Code for letter style, size, spacing, and location. Locate as directed by Commissioner.

a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

1) Location: Applied to cabinet door.
2) Application Process: Silk-screened.
3) Lettering Color: Red.
4) Orientation: Vertical.

M. Materials:

1. Cold-Rolled Steel: ASTM A1008/A1008M, Commercial Steel (CS), Type B.

a. Finish: Baked enamel, TGIC polyester powder coat, HAA polyester powder coat, epoxy powder coat, or polyester/epoxy hybrid powder coat, complying with AAMA 2603.
b. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
c. Color: As selected by Commissioner from manufacturer's full range.

2. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.3 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Miter corners and grind smooth.
3. Provide factory-drilled mounting holes.
4. Prepare doors and frames to receive locks.
5. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Fabricate door frames of one-piece construction with edges flanged.
3. Miter and weld perimeter door frames and grind smooth.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.4 INSTALLATION OF FIRE-PROTECTION CABINETS

A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights approved by Commissioner.

1. Fire-Protection Cabinet Mounting Height: 42 inches above finished floor to top of fire extinguisher.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semirecessed fire-protection cabinets.
2. Provide inside latch and lock for break-glass panels.
3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Identification:

1. Apply vinyl lettering at locations indicated.

3.5 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Requirements:

1. Section 104413 "Fire Protection Cabinets."

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

1.5 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.9 WARRANTY

A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency.

1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Multipurpose Dry-Chemical Type in Steel Container : UL-rated 1-A:10-B:C, 2.5-lb and 2-A:10-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

1. Mounting Height: Top of fire extinguisher to be at 42 inches above finished floor unless otherwise indicated and required.

END OF SECTION 104416

SECTION 105126 - PLASTIC LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Solid plastic lockers.
2. Benches.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings:

1. Plans, elevations, sections, and attachment details.
2. Details full size.
3. Locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Locations and sizes of cutouts and holes for items installed in lockers.
5. Locker fillers, trim, base, sloping tops, and accessories.
6. Locker identification system and numbering sequence.

C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of locker. Include full range of available options for hardware and accessories involving material, finish, and/or color selection.

D. Samples for Verification: Actual sample of finished products for each type of locker, hardware, and accessory.

1. Size: As indicated on drawings.

E. Sustainable Design Submittals:

1. Product must be made without urea formaldehyde.

1.5 INFORMATIONAL SUBMITTALS

A. Material Test Reports: For panel, by a qualified testing agency.

B. Sample Warranties: For lockers.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 MOCKUPS

A. Build mockups to demonstrate aesthetic effectsand to set quality standards for fabrication and installation.

1. Build mockup of typical corner, including one locker on each side of corner and corner filler, including door panel with specified door hardware, as indicated on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver lockers until spaces to receive them are clean, dry, and ready for their installation.

B. Deliver master and control keys to City of New York by registered mail or overnight package service**.** Coordinate with Commissioner.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of construction contiguous with lockers by field measurements, and coordinate before fabrication.

1.10 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that lockers can be supported and installed as indicated.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of lockers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Faulty operation of locks or hardware.
c. Deterioration of finishes and materials beyond normal use.

2. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. Accessibility Regulations: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1-2009 for lockers and benches designated as accessible.

C. Product must be made without urea formaldehyde.

2.2 SOLID PLASTIC LOCKERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Scranton Products or comparable product by one of the following:

1. ASI Storage Solutions.
2. Ideal Products, Inc.
3. Partition Systems International of South Carolina (PSISC); Columbia Systems International of South Carolina LLC.
4. Or approved equal.

B. Construction Style: Manufacturer's standard factory-assembled flush overlay units.

C. Locker Body: Solid plastic-core material, high-density polyethylene (HDPE) material, seamless with eased edges, and homogenous color throughout thickness of material.

1. Thickness: Manufacturer's standard

D. Doors: Solid plastic-core material same as locker body.

1. Thickness: Manufacturer's standard.

E. End Panels: Match style, material, construction, thickness, and finish of doors.

F. Fixed Shelves: Match style, material, construction, and finish of locker body.

1. Thickness: 5/8 inch.

G. Corners and Filler Panels: Match style, material, construction, thickness, and finish of doors.

H. Continuous Finish Base: Match style, material, construction, thickness, and finish of doors; fabricated in lengths as long as practical to enclose base and base ends of lockers.

I. Continuously Sloping Tops: Match style, material, construction, thickness, and finish of doors, for installation over lockers with separate flat tops. Fabricate tops in lengths as long as practical, without visible fasteners at splice locations. Provide fasteners, supports, and closures, as follows:

1. Closures: -End type as indicate don drawings.
2. Sloping-top corner fillers, mitered.

J. Pedestal Supports: Provide adjustable pedestal support legs with all necessary hardware for attachment of continuous finish base.

2.3 HARDWARE

A. Locking Device:

1. Padlock Hasp: Recessed, steel, through bolted.

a. Finish: Manufacturer's standard.

2. Cylinder Lock: Built-in, flush cam locks with five-pin tumbler keyway, keyed separately and master keyed. Furnish two change keys for each lock and two master keys.

a. Key Type: Flat , with minimum 2-by-2.68-inch key head for accessible lockers.
b. Bolt Operation: Manually locking deadbolt or automatically locking spring bolt.

3. Built-in Push-Button Combination Lock: Mechanical combination locks; capable of at least 2000 combination changes.

a. Bolt Operation: Manually locking deadbolt or automatically locking spring bolt.
b. Finish: Manufacturer's standard.

4. Digital Lock: Battery-powered electronic keypad operation with shared- or assigned-use functionality with LED usage indicator and auto-unlock; managed with electronic keys or mobile device.

a. Style: Standard body style; without pull handle.
b. Finish: Manufacturer's standard.

B. Hinges:

1. Continuous Hinges: Full height, back mounted; manufacturer's standard material and finish.

C. Handle:

1. Recessed Handle: Recessed cup with integral door pull.

a. Material and Finish: Manufacturer's standard.

2. Accessible Handle: Metal, fixed, graspable lever handle and rose trim; surface mounted.

a. Material and Finish: Manufacturer's standard.

D. Hooks: Ball-pointed hooks. Attach hooks with at least two fasteners.

1. Hook Configuration:

a. Provide one double-prong wall hook for each compartment of single-tier lockers.
b. Provide one double-prong ceiling hook for each compartment of interlocking lockers.

2. Material and Finish: Manufacturer's standard.

2.4 ACCESSORIES

A. Number Identification:

1. Manufacturer's standard.

2.5 BENCHES

A. Bench Top: 3/4-inch- thick, solid plastic-core material with radiused corners, eased and polished edges.

B. Bench Supports:

1. Floor Mounted: Manufacturer's standard powder-coated-steel, pedestals.

2.6 MATERIALS

A. Anchors: Material, type, size, and finish as required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.7 FABRICATION

A. Fabricate each locker with shelves, an individual door and frame, an individual top, a bottom, and a back, and with common intermediate uprights separating compartments.

1. Fabricate lockers to dimensions, profiles, and details indicated.

B. Fabricate lockers square, rigid, without warp, and with finished faces flat and free of dents, scratches, and chips. Accurately factory machine components for attachments. Make joints tight and true.

C. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches above the floor.
2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.
3. Provide and install sticker or accessibility symbol indicator to exterior side of locker.

D. Venting: Fabricate lockers with space between doors and locker assembly of not less than 1/4 inch.

E. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Use only manufacturer's nuts, bolts, screws, and other devices for assembly.

F. Shop cut openings, to maximum extent possible, to receive hardware, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine walls and floors or support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify that furring is attached to concrete and masonry walls that are to receive lockers.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install lockers level, plumb, and true; shim as required, using concealed shims.

1. Connect single rows of lockers together side-to-side at each locker. Connect back-to-back lockers together side-to-side at each locker and back-to-back at every other locker. Use manufacturer's standard connecting bolts, through predrilled holes, with no exposed fasteners on face frames. Fit lockers accurately together to form flush, tight, hairline joints.
2. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c., using manufacturer's standard concealed fasteners for material indicated.

a. Anchor single rows of lockers to walls near top and bottom of lockers.

B. Install lockers without distortion so doors fit openings properly and are accurately aligned. Adjust hardware to center doors in openings, providing unencumbered operation. Complete installation of hardware and accessory items as indicated.

C. Installation Tolerance: No more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line. Shim as required with concealed shims.

D. Scribe and cut corner and filler panels to fit adjoining work using fasteners concealed where practical. Repair damaged finish at cuts.

E. Attach sloping-top units to lockers, with end panels covering exposed ends.

F. Install number identification plates after lockers are in place.

1. Attach number identification plate on each locker door, near top, centered, with at least two screws with finish matching the plate.

G. Fixed Locker Benches: Provide no fewer than two pedestals for each bench, uniformly spaced not more than 72 inches apart. Securely fasten tops of pedestals to undersides of bench tops, and anchor bases to floor.

3.4 ADJUSTING

A. Clean, lubricate, and adjust hardware. Adjust doors to operate easily without binding. Verify that integral locking devices operate properly.

3.5 PROTECTION

A. Protect lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

B. Touch up marred finishes, or replace lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 105126

SECTION 111136 - VEHICLE CHARGING EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. DC electric vehicle charging system equipment.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" specifies additional requirements applicable to coordinating, scheduling, and sequencing of the Work specified in this Section.
2. Section 260553 "Identification for Electrical Systems" specifies identification products.

1.3 DEFINITIONS

A. CCS: Combined charging system; a means for using the same connector port for both AC Level 2 charging and DC Level 2 fast charging.

B. EV: Electric vehicle.

C. EVCE: Electric vehicle charging system equipment. This term refers to DC Level 2 charging equipment located off-board the vehicle.

D. Fastened in Place: Does not require tools to be removed and replaced.

E. Fixed in Place: Requires tools to be removed and replaced.

F. OCPP: Open Charge Point Protocol; an application protocol for communication between EVs and a central management system.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Product Listing: Include copy of unexpired approval letter, on letterhead of qualified electrical testing agency, certifying product's compliance with specified listing criteria.

    a. Listing criteria identified in approval letter must match specified listing criteria. UL label indicating approval of equipment's enclosure is not considered approval of equipment for intended application.
    b. Product identification in approval letter must match product branding and model numbers in submittal. Approval letters for discontinued or superseded products are not acceptable for submitted product.

2. Include manufacturer's sample warranty language.

B. Shop Drawings: Prepare and submit the following:

1. Routing and attachment of permanent wiring for EVCE.

    a. Include plans, elevations, sections, details, and attachments to other work.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that vehicle charging equipment performs in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within warranty period.

1. Warranty Period: Two years from date of Substantial Completion

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Products or components listed and labeled in accordance with NFPA 70 by qualified electrical testing laboratory, and marked for intended location and application.

2.2 DC ELECTRIC VEHICLE CHARGING SYSTEM EQUIPMENT

A. Description: EVCE located off-board the vehicle that is designed for providing DC Level 2 fast charging of vehicle batteries.

B. UL FFTG - DC EV Charging System Equipment

1. Sole-Source Product: Provide Express 250 as manufactured by Chargepoint, Inc:
    a. No substitutions permitted.

2. Source Limitations: Obtain products from single manufacturer.
3. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:

    a. EVCE: UL CCN FFTG; including UL 2202.
    b. Personnel Protection: UL CCN FFUQ2; including UL 2231-1 and UL 2231-2.

4. Standard Features: Complies with Article 625 of NFPA 70.
5. Sustainable Design Features:

    a. Lead Content for Electrical Wire and Cable: Less than 300 ppm.
    b. Equipment has earned ENERGY STAR product label.
    c. Corporate Sustainability Report: Provide third-party-verified corporate sustainability report that is publicly available from manufacturer and that includes environmental impacts of extraction operations and activities associated with product and its supply chain.

6. Other Available Features Required by the Project:

    a. Location Rating: Indoor/outdoor.
    b. Input Feeder Rating: 480Y/277 V(ac), three phase, 60 Hz, 100 A.
    c. Output Quantity: 1.
    d. Output Wiring: Flexible cord.

        1) Output Cable Nominal Length: 14 ft.
        2) Cable management system.
        3) Output Attachment Plug: CCS Combo 1 CHAdeMO (Japan) NACS.

    e. Mounting: As indicated on Drawings.
    f. Networking:

        1) WAN Communications: Cellular GSM.
        2) LAN Communications: 802.11 b/g/n WiFi.
        3) Capable of remote configuration and reporting.

    g. Authorization or Payment System:

        1) RFID reader, NFC reader
        2) PCI compliant.
        3) Capable of remote control and authorization.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine walls, floors, and bollards or posts for suitable conditions where vehicle charging equipment will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF VEHICLE CHARGING EQUIPMENT

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation:

1. Unless more stringent requirements are specified in Contract Documents or manufacturer's published instructions, comply with Article 625 of NFPA 70 and with NECA NEIS 413.
2. Consult Commissioner for resolution of conflicting requirements.

C. Special Installation Techniques:

1. Hard-Wired Connection: Provide fusible safety switch, that is lockable in "Off" position, in readily accessible location for termination of input cable.
2. Fastened in Place: Comply with manufacturer's published instructions for installing mounting hardware. Provide manufacturer's recommended seismic controls when required for compliance with the Project's requirements.
3. Fixed in Place: Comply with manufacturer's published instructions for installation and torqueing of hardware fasteners. Provide manufacturer's recommended seismic controls when required for compliance with the Project's requirements.
4. Base Mounting: When indicated on Drawings or in manufacturer's published instructions, provide concrete bases for installing vehicle charging equipment.
5. Identification: Provide labels for vehicle charging equipment and associated electrical equipment.

    a. Identify field-installed conductors, interconnecting wiring, and components.
    b. Provide warning signs.
    c. Label each enclosure with engraved metal or laminated-plastic nameplate.

D. Cybersecurity:

1. Software:

    a. Coordinate security requirements with City of New York IT department.
    b. Ensure that latest stable software release is installed and properly operating.
    c. Disable or change default passwords to password of at least eight characters in length, using a combination of uppercase and lower letters, numbers, and symbols. Record passwords and turn over to party responsible for system operation and administration.

2. Hardware:

    a. Coordinate location and access requirements with City of New York IT department.

b. Enable highest level of wireless encryption that is compatible with City of New York's information and communications technology network.
c. Disable dual network connections.

E. Interfaces with Other Work:

1. Coordinate installation of new vehicle charging equipment with existing conditions.
2. Work must be rated to handle available fault current on input feeder.
3. Provide appropriate warning labels for arc-flash hazard on input feeder.

3.4 FIELD QUALITY CONTROL OF VEHICLE CHARGING EQUIPMENT

A. Administrant for Low-Voltage Electrical Tests and Inspections:

1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

B. Administrant for Communications Tests and Inspections:

1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

C. Field tests and inspections must be witnessed by Commissioner.

D. Tests and Inspections:

1. Perform manufacturer's recommended tests and inspections.
2. For each unit of vehicle charging equipment, perform the following tests and inspections:

a. Unit self-test.
b. Operation test with load bank.
c. Operation test with EV.
d. Network communications test.

E. Nonconforming Work:

1. Unit will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

F. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports.

G. Manufacturer Services: Engage factory-authorized service representative to support field tests and inspections.

1. Manufacturer's Field Reports for Field Quality-Control Support: Prepare report after each visit by factory-authorized service representative, documenting activities performed at the Project site.

3.5 SYSTEM STARTUP

A. Perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's published instructions.

B. Manufacturer Services: Engage factory-authorized service representative to support system startup.

1. Manufacturer's Field Reports for System Startup Support: Prepare and submit report after each visit by factory-authorized service representative, documenting activities performed at the Project site.

3.6 PROTECTION

A. After installation, protect vehicle charging equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

3.7 GUARANTY SERVICE AGREEMENT

A. Software and Firmware Service Agreement:

1. Technical Support: Beginning at Substantial Completion, verify that software and firmware service agreement includes software and firmware support for one year.
2. Upgrade Service: At Substantial Completion, update software and firmware to latest version. Install and program software and firmware upgrades that become available within one year from date of Substantial Completion. Verify that upgrading software includes operating system and new or revised licenses for using software.

a. Upgrade Notice: No fewer than 30 days to allow City of New York to schedule and access the system and to upgrade computer equipment if necessary.

3. Field Reports for Software and Firmware Upgrades: Prepare and submit report after each update, documenting upgrades installed.

END OF SECTION 111136

SECTION 113010 - APPLIANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Refrigeration appliances.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Refrigeration appliances.

B. Sustainable Design Submittals:

1. Product Data: For indicated products.
2. ENERGY STAR: Product Data for indicated products, showing compliance with requirements for ENERGY STAR product labeling.

C. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard size.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of appliance.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 WARRANTY

A. Warranties: Manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with applicable provisions in the DOJ's 2010 ADA Standards for Accessible Design and ICC A117.1-2009.

2.2 REFRIGERATION APPLIANCES

A. Refrigerator/Freezer: APP-1 and APP-2: One-door refrigerator with freezer compartment inside and complying with AHAM HRF-1.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Frigidaire and Bertazonni or comparable product by one of the following:

a. GE Appliances; Haier Group.
b. LG Electronics USA, Inc.; LG Electronics Inc.
c. Whirlpool Corporation.
d. Or approved equal.

2. Type: APP-1 Freestanding and APP-2 Undercounter.
3. Dimensions: As indicated by manufacturers product designation.
4. Storage Capacity: As indicated by manufacturers product designation
5. General Features: As indicated by manufacturers product designation

a. Door Configuration: Overlay.

6. Refrigerator Features:

a. Interior light in refrigeration compartment.
b. Door Storage: Modular compartments.

7. Freezer Features: One freezer compartment(s) configured as pull-out drawer(s).

a. Interior light in freezer compartment.

8. Energy Star: Provide appliances that qualify for the EPA/DOE Energy Star product-labeling program.

9. Appliance Color/Finish: As indicated by manufacturers product designation.

2.3 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install appliances according to manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate residential appliances.

END OF SECTION 113010

SECTION 116623 - GYMNASIUM EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Basketball equipment.
2. Volleyball equipment.
3. Safety pads.
4. Indoor, single-sided LED basketball, volleyball and wrestling scoreboard with control center.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for installation of floor-insert sleeves to be cast in concrete slabs and footings.
2. Section 096466 "Wood Athletic Flooring" for game lines and markers.
3. Section 116653 "Gymnasium Dividers" for gymnasium divider curtain systems.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include assembly, disassembly, and storage instructions for removable equipment.
2. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.
3. Scoreboard, control and ccessories.

B. Shop Drawings:

1. For gymnasium equipment.

a. Include plans, elevations, sections, and attachment details.
b. Include details of field assembly for removable equipment, connections, installation, mountings, floor inserts, and operational clearances.
c. Include transport and storage accessories for removable equipment.
d. Include diagrams for power, signal, and control wiring.

2. Scoreboard face layout, dimensions, electrical wiring diagrams,structural support and mounting.

C. Engineering Services Submittal: For basketball backstop support, including structural analysis calculations for backstop attachments, signed and sealed by the qualified engineer licensed in the State of New York responsible for their preparation.

D. Samples: For each exposed product and for each item and color specified.

E. Coordination Drawings: Court layout plans, reflected ceiling plans, and other details, drawn to scale, and coordinated with ceiling-suspended gymnasium equipment, floor inserts, game lines, and markers applied to finished flooring, and coordinated with each other, using input from installers of the items involved:

1. Structural members to which overhead-supported gymnasium equipment will be attached.
2. Suspended ceiling components, if any.
3. Items supported from building structure above the courts, including the following:

a. Luminaires.
b. Air outlets and inlets.
c. Speakers.
d. Sprinklers.
e. Smoke detectors.
f. Acoustical treatments or panels.
g. Access panels.

F. Setting Drawings: For embedded items and cutouts required in other work.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of gymnasium equipment.

B. Sample Warranty: For each product warranty.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 FIELD CONDITIONS

A. Field Measurements: Verify position and elevation of floor inserts and layout for gymnasium equipment.

1.8 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of gymnasium equipment and scoreboards that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Basketball backboard failures, including glass breakage.

b. Faulty operation of basketball backstops.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design basketball backstop support and attachment to building structure.

B. Seismic Performance: Basketball backstops and anchors must withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.2 BASKETBALL EQUIPMENT

A. Basis-of-Design Product: Subject to compliance with requirements, provide Gared; Model 2400 wall-mounted assembly or comparable product by one of the following:

1. Draper Inc.
2. Porter Athletic Equipment Company.
3. Spalding Equipment.
4. Or approved equal.

B. Standard Rules: Protruding fasteners or exposed bolt heads on front face of backboards are not permitted.

C. Connections: Manufacturer's standard connections or connections recommended in writing by manufacturer and complying with Section 055000 "Metal Fabrications" of size and type required to transfer loads to building structure.

D. Wall-Mounted Backstops: Complete assembly extending from wall, including support framing to building structure, bracing, cables, support chains, pulleys, fittings, hardware, pipe anchors, equipment pads, and fasteners.

1. Folding Type: Manufacturer's standard assembly for upward-folding backstop.
2. Framing: Steel pipe, tubing, and shapes designed to minimize vibration during play.

a. Finish: Manufacturer's standard polyester powder-coat finish.

3. Extension: Varies, as indicated on Drawings.

E. Backstop Safety Device: Designed to limit free fall if support cable, chains, pulleys, fittings, winch, or related components fail; with mechanical automatic reset; 6000-lb load capacity; one per folding backstop.

1. Retractor Device: Manufacturer's standard device designed to retract both support and safety cables, chains, and straps away from play of the basketball when backstop is in playing position; one per folding backstop.

F. Backstop Electric Operator: Provide operating machine of size and capacity recommended in writing by manufacturer for equipment specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, and remote controls. Coordinate wiring requirements and electrical characteristics with building electrical system.

1. Electrical Components, Devices, and Accessories: Listed and labeled according to NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operator Type: Cable drum with grooved drum and cable tension device to automatically take up cable slack and retain cable in grooves.
3. Operator Mounting: As indicated in Drawings.

4. Remote-Control Station(s): NEMA ICS 6, Type 1 enclosure for mounting and momentary-contact, three-position, switch-operated control with up, down, and off functions.

   a. Keys: Provide dual keys, one key for up and one for down per station.

5. Limit Switches: Adjustable switches at each backstop, interlocked with motor controls and set to automatically stop backstop at fully retracted and fully lowered positions.

G. Basketball Backboards:

1. Shape and Size:FOB = Face of Bank/ Backboard.

   a. Rectangular, 72 by 42 inches, 72 by 48 inches .

2. Backboard Material: Provide with predrilled holes or preset inserts for mounting goals, and as follows:

   a. Glass: Minimum 1/2-inch- thick, transparent tempered glass according to ASTM C1048 Kind FT (fully tempered) and with impact-testing requirements in 16 CFR 1201 Category II or ANSI Z97.1 Class A for safety glazing. Provide glass and framing system manufactured according to FIBA Level 1 or Level 2 requirement that glass does not split off if broken.

      1) Frame: Provide glass with impact-absorbing resilient rubber or PVC gasket around perimeter in a fully welded, painted steel brushed-natural-finish, extruded-aluminum frame, with steel subframe, reinforcement, bracing, and mounting slots for mounting backboard frame to backstop.
      2) Standard Mount: Provide steel corner reinforcement with mounting slots for mounting backboard frame to backstop at standard mounting centers. Provide center-strut frame reinforcement.

3. Target Area and Border Markings: Marked in orange, with manufacturer's standard pattern and stripe width.
4. Finish: Manufacturer's standard factory-applied, white background.

H. Goal-Mounting Assembly: Compatible with goal, backboard, and backstop; with manufacturer's standard hole pattern for goal attachment.

1. Direct Mount: Designed for mounting goal directly and independently to center mast of backstop, so that no force is transmitted by ring directly to backboard, and rigidity and stability of goal are maximized.

I. Basketball Goals: Basket ring complete with flanges, braces, attachment plate, and evenly spaced loops welded around underside of ring.

1. Double-Rim Basket Ring: Fabricated with two rims, manufacturer's standard-diameter steel rod welded into 18-inch ID rings.
2. Type:

   a. Fixed: Nonmovable.

3. Pressure-Release Characteristics: Positive-lock movable breakaway design, with manufacturer's standard mechanism, including preset pressure release, set to release between 181- and 231-lb load, and automatic reset. Provide movable ring with rebound characteristics identical to those of fixed, nonmovable ring.
4. Field Adjustment: Provide ring that is field adjustable for rebound elasticity without being removed from the backboard.
5. Mount: Front.
6. Net Attachment: No-tie loops for attaching net to ring without tying.
7. Finish: Polyester powder-coat finish.

J. Basketball Nets: 12-loop-mesh net, between 15 and 18 inches long, sized to fit ring diameter, and as follows:

1. Cord: Made from white nylon.
2. Competition Cord: Antiwhip, made from white nylon cord, minimum 120-gm thread and maximum 144-gm thread.

K. Backboard Safety Pads: Designed for backboard thickness and extending continuously along bottom and up sides of backboard and over backstop according to manufacturer's standard design.

1. Attachment: Manufacturer's standard.
2. Color: As selected by Commissioner from manufacturer's full range.

2.3 VOLLEYBALL EQUIPMENT

A. Basis-of-Design Products: Subject to compliance with requirements, provide products from Draper Inc. or comparable product one of the following:

1. Jaypro Sports, LLC.
2. Porter Athletic Equipment Company.
3. Spalding Equipment.
4. Or approved equal.

B. Floor Insert: Solid-brass floor plate and steel pipe sleeve, concealed by floor plate, with capped bottom end, sized with ID to fit post standards, minimum length required, to securely anchor pipe sleeve ; with anchors designed for securing floor insert to floor substrate indicated; .

1. Flush Floor Plate: Self-locking, hinged access cover, designed to be flush with adjacent flooring. Provide tool(s) for unlocking access covers.
2. Floating Wood Floor, Floor Plate: Lockable swivel access cover, designed for use with floating wood floors and to be flush with adjacent flooring. Provide two tool(s) for unlocking access covers.

2.4 SAFETY PADS

A. Basis-of-Design Product: Subject to compliance with requirements, provide products from Draper Inc. or comparable product by one of the following:

1. Jaypro Sports, LLC.
2. Porter Athletic Equipment Company.
3. Spalding Equipment.
4. Or approved equal.

B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

C. Pad Coverings: Provide safety pad fabric covering that is fabricated from puncture- and tear-resistant, PVC-coated polyester or nylon-reinforced PVC fabric, minimum 14-oz./sq. yd. and treated with fungicide for mildew resistance; with surface-burning characteristics indicated, and lined with fire-retardant liner.

D. Wall Safety Pads: Padded wall wainscot panels designed to be attached in a continuous row; each panel section consisting of fill laminated to backer board, with visible surfaces fully covered by seamless fabric covering, free of sag and wrinkles and firmly attached to back of backer board.

1. Backer Board: Minimum 3/8-inch- thick plywood, mat formed, or composite panel.
2. Fire-Resistive Fill: Multiple-impact-resistant foam minimum 2-inch- thick, fire-resistive neoprene, 6.0-lb/cu. ft. density.
3. Size: Each panel section of manufacturer's standard dimensions unless otherwise indicated on Drawings.
4. Number of Modular Panel Sections: As indicated on Drawings.
5. Installation Method: Concealed mounting Z-clips.
6. Fabric Covering Color(s): As selected by Commissioner from manufacturer's full range for color(s).

2.5 MATERIALS

A. Support Cable: Manufacturer's standard galvanized-stranded-steel wire rope with a breaking strength of 7000 lb. Provide fittings according to the wire rope manufacturer's written instructions for size, number, and installation method.

B. Support Chain and Fittings: For chains used for overhead lifting, provide Grade 80 heat-treated alloy-steel chains, according to ASTM A391/A391M, with commercial-quality, hot-dip galvanized or zinc-plated steel connectors and hangars.

C. General-Purpose Chain: For chains not used for overhead lifting, provide carbon steel chain, according to ASTM A413/A413M (Grade 30 proof coil chain or higher grade recommended by gymnasium equipment manufacturer). Provide coating type, chain size, number, and installation method according to manufacturer's written instructions.

D. Castings and Hangers: Malleable iron, according to ASTM A47/A47M; grade as required for structural loading.

E. Softwood Plywood: DOC PS 1, exterior.

F. Equipment-Mounting Board: Wood, transparent or neutral-color-painted finish; size and quantity as required to mount gymnasium equipment according to manufacturer's written instructions.

G. Anchors, Fasteners, Fittings, and Hardware: Gymnasium equipment manufacturer's standard corrosion-resistant or noncorrodible units; concealed; tamperproof, vandal- and theft-resistant design.

H. Grout: Nonshrink, nonmetallic, premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout, according to ASTM C1107/C1107M, with minimum strength recommended in writing by gymnasium-equipment manufacturer.

2.6 SCOREBOARD WITH CONTROL CENTER

A. Basis-of-Design Product: Subject to compliance with requirements, provide Spectrum Corporation; Basketball Scoreboard Model 5218T-C2 with MSX control scoring console or comparable product by one of the following:

1. Draper Inc.
2. Porter Athletic Equipment Company.
3. Spalding Equipment.
4. Or approved equal.

B. Solid State Scoreboard: Must include the following displays:

1. 99:59 Minute Clock/timer
2. Home and Visitor Scores
3. FOULS for Home and Visitor
4. PLAYER FOULS
5. TOL (Time Outs Left) for Home and Visitor
6. WON GAME-WON for Volleyball Scoring
7. PERIOD
8. Double Bonus Indicators
9. Team Name in place of HOME

C. General:

1. Dimensions: 4’ H x 8’ W x 5” D.
2. Weight: 163 lbs. (86 kg).
3. Power requirements: 408 VA,120 VAC.
4. Finish:Premium Polyurethane.

a. Color: As selected by Commissioner from manufacturers stock colors.

5. Deluxe game horn rated at 100 dB @ 10’0”.
6. must have Border Trim and Clock Striping.
7. Functionality must include:

   a. Clock counts down.
   b. Segment Timer capable.
   c. Home and Visitor scores 0-199.
   d. Period 1-4.
   e. Preprogrammable Double Bonus indicators.
   f. Team fouls 0-99
   g. Time Out Left for home and visitor.
   h. Time-Out Timer displays time remaining.
   i. User selectable 1/10 or 1/100 second displays in last minute of a period.
   j. Automatic clock reset and period advance.
   k. Automatic Quarter reset.
   l. Automatic Substitution feature.
   m. Programmable Celebration Flash Feature.
   n. Instant reset and posting for all digits.

D. Materials:

1. Scoreboard face: 22g galvanized steel with premium polyurethane finish.
2. Scoreboard back: 24g galvanized steel.
3. Digit face plate: 0.125 acrylic lexan clear sheet.

E. Digital image: Combination of red and amber LED digits must be covered with 1/8 inch thick polycarbonate.

1. Must be rated 100,000 hours of use.
2. Must be 8-segment solid stroke design.
3. LED digits must be individually serviceable from the front of the scoreboard cabinet.
4. Scoreboard assembly must include Twenty (20) numeric LED digits, four (4) B’s for bonus and double bonus, two (2) arrows for possession.

F. Captions:

1. HOME and VISITOR must be 6” high (15 cm)
2. Team fouls, player number, player fouls and TOL must be 4” high (10 cm)
3. Games won, game number and period must be 3” high (8 cm)
4. Captions must be high performance vinyl applied directly to scoreboard face.

G. Control Scoring Console: Controller functionality must include:

1. Easy set up for 15 different sports
2. Changeable key pad inserts for other sports.
3. Memory backup to retain configurations and eliminate data loss.
4. Durable, lockable rugged waterproof carry case

5. Ten (10) foot (3 m) low voltage data cable cord that connects to control receptacle junction box and must unplug and store inside the carrying case.
6. Easy Programming:

    a. Celebrate a home score with flashing numbers.
    b. Option to use as a Practice Segment Timer or Time of Day Clock.
    c. Tenth of a second timing to allow more accurate timing during last minute of play.
    d. Track-timing interface displays track-timing information from automatic-timing systems on football scoreboard

7. Connection: Radio control as selected by Commissioner.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for court layout, alignment of mounting substrates, installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance of the Work.

    1. Verify critical dimensions.
    2. Examine supporting structure, subfloors, and footings below finished floor.
    3. Examine wall assemblies, where reinforced to receive anchors and fasteners, to verify that locations of concealed reinforcements are clearly marked. Locate reinforcements and mark locations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions.

B. Install gymnasium equipment after other finishing operations, including painting, have been completed unless otherwise indicated.

C. Permanently Placed Gymnasium Equipment and Components: Install rigid, level, plumb, square, and true; anchored securely to supporting structure; positioned at locations and elevations indicated; in proper relationship to adjacent construction; and aligned with court layout.

    1. Floor-Insert Locations: Coordinate locations with application of game lines and markers, and core drill floor for inserts after game lines are applied.
    2. Floor-Insert Elevation: Coordinate installed heights of floor inserts with installation and field finishing of finish flooring and floor-plate type.

3. Operating Gymnasium Equipment: Verify clearances for movable components of gymnasium equipment throughout entire range of operation and for access to operating components.

D. Anchoring to In-Place Construction: Use anchors and fasteners where necessary to secure built-in and permanently placed gymnasium equipment to structural support and to properly transfer load to in-place construction.

E. Connections: Connect electric operators to building electrical system.

F. Removable Gymnasium-Equipment Components: Assemble in place to verify that equipment and components are complete and in proper working order. Disassemble removable gymnasium equipment after assembled configuration is approved by Commissioner, and store units in location indicated on Drawings.

3.4 INSTALLATION OF SAFETY PADS

A. Mount with bottom edge at 4 inches above finished floor unless otherwise indicated on Drawings.

B. Cutout Trim: Limit cuts in face of padding so that cuts are securely and fully concealed behind trim-kit flange.

3.5 ADJUSTING

A. Adjust movable components of gymnasium equipment to operate safely, smoothly, easily, and quietly; free from binding, warp, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range; and lubricate as recommended in writing by manufacturer.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate gymnasium equipment including scoreboard.

END OF SECTION 116623

SECTION 116653 - GYMNASIUM DIVIDERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Peak-fold divider systems.
2. Divider system accessories.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.

B. Shop Drawings: For gymnasium dividers.

1. Include plans showing alignment of curtains in relation to sport-court layout and overhead structural supports.
2. Include elevations, sections, details, and attachments to other work.
3. Include system clearances, stacking requirements, and limits for fitting into adjacent construction.
4. Include point loads and locations for attachment of gymnasium dividers to structure.
5. Include diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each item and color specified.

D. Coordination Drawings: Reflected ceiling plans with divider-curtain layouts, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Structural members to which divider-curtain systems will be attached.
2. Suspended ceiling components, if any.
3. Items supported from building structure, including the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Smoke detectors.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of gymnasium divider.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of gymnasium dividers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Faulty operation of gymnasium dividers.
    b. Tearing or deterioration of fabric, seams, or other materials beyond normal use.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Basketball backstops and anchors must withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.2 PEAK-FOLD DIVIDER SYSTEMS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Gared; Ridge-Fold Gym Divider, Model 4025 Slope-Fold or comparable product by one of the following:

1. Jaypro Sports, LLC.
2. Performance Sports Systems.
3. Porter Athletic Equipment Company.
4. Spalding Equipment.

5. Or approved equal.

B. Product Description: Electrically operated, fold-up gymnasium divider including motor winch, cables, sheave assemblies, controls, clamps for attachment to building structure, supports, and other components required for complete functional installation.

C. Operation: Gym divider must utilize pivot joints to fold compactly into roof contour. Curtain moves by accordion fold-up action as weighted bottom is raised by hoist lines passing through curtain grommets. Hoist lines pass through sheave assemblies attached to roof structure. Lines pass through intermediate sheaves which act as idler assemblies and direct lines to motorized winch. Lines terminate at individual drums sized in variable ratios allowing raised curtain to conform to roof slope.

D. Configuration: Pivot joints in top and bottom batten pipes allow divider to conform to roof contour in both open and stored positions. Divider extends across room as indicated on Drawings.

1. Minimum required clearance between vertical curtain edges and adjacent fixed objects: 6 inches.
2. Provide 36 inch space between curtain ends and walls or fixed objects to allow passage space around divider.Divider-Curtain System: Electrically operated, upward folding, cable suspended, and as follows:
3. Top Hem: Double-thickness mesh or solid vinyl for pipe battens.
4. Outer Edge Hems: Triple turned and welded.
5. Bottom Curtain Pocket: 6 inches with manufacturer's standard pipe batten.
6. Grommets: Manufacturer's standard material, size, and spacing; for lift cables to pass through curtain fabric.
7. Support Cable: 1/8-inch- diameter steel cable with a breaking strength of 2100 lb. Provide fittings according to cable manufacturer's written instructions for size, type, number, and installation method.
8. Support Chain and Fittings: Hardened alloy-steel chain rated for lifting loads indicated, with commercial-quality, corrosion-resistant steel connectors and hangers.

    a. Top and Bottom Battens: 1-5/8-inch- nominal diameter steel pipe.

9. Sheave Assemblies: Heavy-duty assemblies with roller bearings and attached to roof structure at each hoist location.

E. Operating winch: Powered with C-Face motor sized for specific project torque requirements and equipped with thermal overload protection and rotary counting limit switch to control curtain travel. Individual drums sized in variable ratios must be provided for factory termination of each cable. Winch to be attached to roof structure.

2.3 ELECTRIC OPERATORS

A. Provide factory-assembled electric operation system of size and capacity recommended in writing and provided by gymnasium divider manufacturer for gymnasium dividers specified, with electric motors and factory-prewired motor controls, control devices, and accessories required for proper operation.

1. Include wiring from control stations to motors and between synchronizer and dual motors for long curtains. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

B. Electrical Components, Devices, and Accessories: Listed and labeled according to NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.4 DIVIDER SYSTEM ACCESSORIES

A. Audible Motion Alarm: Provide alarm with intermittent warning tone when curtain is raised or lowered.

2.5 SUPPORT MATERIALS AND FASTENERS

A. Support Chain and Fittings: For chains used for overhead lifting, provide Grade 80, heat-treated alloy-steel chains, according to ASTM A 391/A 391M, with commercial-quality, steel connectors and hangers.

B. General-Purpose Chain: For chains not used for overhead lifting, provide carbon steel chain, according to ASTM A 413/A 413M, Grade 30 proof coil chain or higher grade recommended by gymnasium divider manufacturer. Provide coating type, chain size, number, and installation method according to manufacturer's written instructions.

C. Anchors, Fasteners, Fittings, and Hardware: Manufacturer's standard corrosion-resistant or noncorrodible units; concealed; tamperproof, vandal-resistant design unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for alignment of mounting substrates, installation tolerances, operational clearances, locations of connections to building electrical system, and other conditions affecting performance of the Work.

1. Verify critical dimensions.
2. Examine supporting structure.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions.

B. Install gymnasium dividers after other finishing operations, including painting, have been completed unless otherwise indicated.

C. Install gymnasium dividers level, plumb, square, and true; anchored securely to supporting structure; positioned at locations and elevations indicated; in proper relation to adjacent construction; and aligned with sport-court layout.

1. Verify clearances for movable components of gymnasium dividers throughout entire range of operation and for access to operating components.
2. Attach sheaves and winch to structural support with beam clamps, steel angle brackets.

D. Electric Operators Installation: Connect electric operators to building electrical system.

3.4 ADJUSTING

A. Adjust movable components of gymnasium dividers to operate safely, smoothly, easily, and quietly, free from binding, warp, distortion, uneven tension, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range; and lubricate as recommended in writing by manufacturer.

B. Limit Switch Adjustment: Set and adjust upper and lower limit controls.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate gymnasium dividers.

END OF SECTION 116653

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Manually operated single-roller shades.
2. Manually operated, double-roller shades.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified, 10 inches long.

D. Product Schedule: For roller shades.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of shadeband material.

B. Product Test Reports: For each type of shadeband material, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Commissioner of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUALLY OPERATED, SINGLE-ROLLER SHADES

A. Basis-of-Design Product: Subject to compliance with requirements, provide products indicated on Drawings from MechoShade Systems, Inc. or comparable product by one of the following:

1. Draper Inc.
2. Hunter Douglas Contract.
3. Springs Window Fashions; SWFcontract.
4. Or approved equal.

B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chains: Stainless steel.
2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.

    a. Provide for shadebands that weigh more than 10 lb or for shades as recommended by manufacturer, whichever criterion is more stringent.

C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: Varies. Coordinate with Commissioner.
2. Direction of Shadeband Roll: Reverse, from front (interior face) of roller unless otherwise indicated on Drawings.
3. Shadeband-to-Roller Attachment: Manufacturer's standard method.

D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

E. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
2. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.
3. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.2 MANUALLY OPERATED, DOUBLE-ROLLER SHADES

A. Basis-of-Design Product: Subject to compliance with requirements, provide products indicated on Drawings from MechoShade Systems, Inc. or comparable product by one of the following:

1. Draper Inc.
2. Hunter Douglas Contract.
3. Springs Window Fashions; SWFcontract.
4. Or approved equal.

B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chains: Stainless steel.

    a. Loop Length: Full length of roller shade.
    b. Limit Stops: Provide upper and lower ball stops.
    c. Chain-Retainer Type: Chain tensioner, jamb mounted Chain tensioner, sill mounted.

2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.

a. Provide for shadebands that weigh more than 10 lbs. or for shades as recommended by manufacturer, whichever criterion is more stringent.

C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Shadeband-to-Roller Attachment: Manufacturer's standard method.

D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.

E. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.
3. Endcap Covers: To cover exposed endcaps.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

1. Opaque Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.

B. Electrical Connections: Connect motor-operated roller shades to building electrical system.

C. Roller Shade Locations: As indicated on Drawings.

3.4 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.5 CLEANING AND PROTECTION

A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Commissioner, before time of Substantial Completion.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate motor-operated roller shades.

END OF SECTION 122413

SECTION 123661.19 - QUARTZ AGGLOMERATE COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Quartz agglomerate countertops.
2. Quartz agglomerate splashes.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

1. Show locations and details of joints.
2. Show direction of directional pattern, if any.

D. Samples for Initial Selection: For each type of material exposed to view.

E. Samples for Verification: For the following products:

1. Countertop material, 6 inches square.
2. One full-size quartz agglomerate countertop, with front edge and backsplash, 8 by 10 inches , of construction and in configuration specified.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.

1. Build mockup of typical countertop as indicated on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

1.7 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of polymers, resins, and pigment and complying with ISFA 3-01.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings by Caesarstone or comparable product by one of the following:

a. Cambria.
b. Cosentino USA.
c. Or approved equal.

2. Colors and Patterns: As selected by Commissioner from manufacturer's full range.

B. Plywood Substrate: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 FABRICATION

A. Fabricate countertops according to quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Premium.

B. Configuration:

1. Front: Straight, slightly eased at top.
2. Backsplash: Straight, slightly eased at corner.
3. End Splash: Matching backsplash.

C. Countertops: 3/4-inch- thick, quartz agglomerate with front edge built up with same material.

D. Backsplashes: 1/2-inch- thick, quartz agglomerate.

E. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly.

F. Joints:

1. Fabricate countertops without joints.

G. Cutouts and Holes:

1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

   a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
   b. Provide 3/4-inch full bullnose edges projecting 3/8 inch into fixture opening.

2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by quartz agglomerate manufacturer.

B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates to receive quartz agglomerate countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.

D. Secure countertops to subtops with adhesive according to quartz agglomerate manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

1. Install metal splines in kerfs in countertop edges at joints where indicated. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.

H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

1. Seal edges of cutouts in particleboard subtops by saturating with varnish.

I. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.19

SECTION 124816 - ENTRANCE FLOOR GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes:

1. Recessed floor grilles and frames.

1.3 COORDINATION

A. Coordinate size and location of recesses in concrete to receive floor grilles and frames.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for entrance floor grilles and frames.

B. Shop Drawings:

1. Divisions between grille sections.
2. Perimeter floor moldings.

C. Samples: For the following products, in manufacturer's standard sizes:

1. Floor Grille: Assembled section of floor grille.
2. Frame Members: Sample of each type and color.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For floor grilles and frames to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 FIELD CONDITIONS

A. Field Measurements: Indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide C/S Group; Gridline 2 G62 or comparable product by one of the following:

1. Kadee Industries, Inc.
2. Mats Incorporated.
3. Nystrom, Inc.
4. Or approved equal.

2.2 ENTRANCE FLOOR GRILLES, GENERAL

A. Structural Performance: Provide floor grilles and frames capable of withstanding the following loads and stresses within limits and under conditions indicated:

1. Wheel Rolling Load Capacity: 1000 lbs. per wheel.

B. Accessibility Standard: Comply with applicable provisions in the DOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1-2009.

2.3 FLOOR GRILLES

A. General: Provide manufacturer's standard floor-grille assemblies consisting of treads of type and profile indicated, interlocked or joined together by cross members, and with support legs (if any) and other components needed to produce a complete installation.

B. Stainless-Steel Floor Grille: Type 316.

1. Surface Treads: 0.071-by-0.177-inch wire with 0.125-inch- wide openings between wires.
2. Support Rods: Spaced 1 inch o.c., welded to each wire.
3. Pit Grating: 1-1/8 inches deep.
4. Stainless-Steel Finish: Mill.
5. Grille Size: As indicated.

C. Lockdown: Manufacturer's standard.

2.4 FRAMES

A. Provide manufacturer's standard frames of size and style for grille type, for permanent recessed installation in subfloor, complete with installation anchorages and accessories. Unless otherwise indicated, fabricate frame of same material and finish as grilles.

2.5 SUPPORT SYSTEM

A. Drainage Pit Applications: Provide manufacturer's special deep-pit frame and support extrusion system with intermediate support beams, sized and spaced as recommended by manufacturer for indicated spans and equipped with vinyl support cushions.

2.6 DRAIN PANS

A. Provide manufacturer's standard, stainless-steel sheet drain pan with NPS 2 drain outlet for each floor-grille unit. Coat bottom of pan with protective coating recommended by manufacturer.

2.7 MATERIALS

A. Stainless Steel Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 304.

B. Stainless-Steel Flat Bars: ASTM A 666, Type 304.

C. Stainless-Steel Angles: ASTM A 276 or ASTM A 479/A 479M, Type 304.

2.8 FABRICATION

A. Shop fabricate floor grilles to greatest extent possible in sizes as indicated. Unless otherwise indicated, provide each grille as a single unit; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in grilles are necessary, space symmetrically and away from normal traffic lanes.

B. Fabricate frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

2.9 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and floor conditions for compliance with requirements for location, size, minimum recess depth, and other conditions affecting installation of floor grilles and frames.

B. Examine roughing-in for drainage piping systems to verify actual locations of piping connections before floor grille and frame and drain pan installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install recessed floor grilles and frames and drain pans to comply with manufacturer's written instructions at locations indicated and with top of floor grilles and frames in relationship to one another and to adjoining finished flooring as recommended by manufacturer. Set floor-grille tops at height for most effective cleaning action. Coordinate top of floor-grille surfaces with doors that swing across grilles to provide clearance under door.

3.4 PROTECTION

A. After completing frame installations, provide temporary filler of plywood or fiberboard in floor-grille recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 124816

SECTION 126600 - TELESCOPING STANDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Wall-attached telescoping stands.

1.3 DEFINITIONS

A. Forward Folding: Wall- or floor-attached bleachers that open in the forward direction by moving the front row away from the stack to the fully extended position.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for telescoping stands.
2. Include load capacities, assembly characteristics, and furnished accessories.
3. Include electrical characteristics of electrical components, devices, and accessories.

B. Shop Drawings: For telescoping stands in both stacked and extended positions.

1. Include plans, elevations, sections, and attachment details.
2. Include load capacities.
3. Show seating layout, aisle widths, row-lettering and seat-numbering scheme, and wheelchair accessibility provisions.
4. Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.

5. Include diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: For each type of exposed product and for each color and texture required.

1. Include Samples of accessories involving color and finish selection.

D. Samples for Verification: For the following products prepared on Samples of size indicated below:

1. Decking: 6-inch- square Samples of finished material.
2. Metal Components: 6-inch- square Sample of each color and finish indicated.
3. Seating Material: 6-inch- square Sample of each seating material, color, and finish indicated.
4. Seat Unit: Full-size unit of each type.
5. Upholstery Fabric: 12-inch- square Sample of fabric from dye lot to be used for the Work, with specified treatments applied.
6. Signage: Full-size units for each type of accessibility sign .

E. Sustainable Design Submittals:

1. Laboratory Test Reports: For composite wood products, indicating compliance with the formaldehyde emissions evaluation.

1.7 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of telescoping stand assembly.

B. Material Certificates: For each type of flame-retardant treatment of upholstery fabric.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 MOCKUPS

A. Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and installation.

1. Build mockup of typical telescoping stand as indicated on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of telescoping stand assembly that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including bench seating and attached components.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Periods: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Telescoping stands to withstand the effects of gravity loads, operational loads, and other loads and stresses in accordance with ICC 300.

B. Accessibility Standard: Comply with applicable provisions in the DOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1-2009.

2.2 WALL-ATTACHED TELESCOPING STANDS

A. Wall-Attached Telescoping Stands: Forward-folding system, in which the bleachers open in the forward direction by moving the front row away from the stack to the fully extended position and the rear of bleacher understructure permanently attaches to wall construction.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Hussey Seating Company; Maxam Manual, Classic Wood or comparable product by one of the following:

a. Interkal LLC.
b. Irwin Seating Company.
c. Royal Stewart Ltd.
d. Or approved equal.

2. Row Spacing: As indicated on Drawings.
3. Row Rise: As indicated on Drawings.
4. Seat Type: Benches.
5. Elevated Front Row: Height indicated on Drawings.
6. Operation: Manually-operated .

2.3 COMPONENTS

A. Benches: Seats and skirts.

1. Material: Lumber with transparent finish.
2. Bench Height: Not less than 16 inches or more than 18 inches.
3. Bench Depth: 12 inches.

B. Wheelchair-Accessible Seating: Locate seating cutouts retractable truncated benches removable modular chairs to provide wheelchair-accessible seating at locations indicated on Drawings.

1. Equip tiers adjacent to wheelchair-accessible seating with front rails as required by ICC 300.
2. Equip cutouts with full-width front closure panels that match decking construction and finish and that extend from underside of tiers adjacent to cutouts to 1-1/2 inches from finished floor.

C. Deck: Plywood, 3/4 inch thick.

1. Finish: Transparent.

    a. Color: As selected by Commissioner from manufacturer's standard colors.

D. Risers: Steel sheet with manufacturer's standard, rust-inhibiting coating or hot-dip galvanized finish.

E. Safety Rails: Steel, finished with manufacturer's standard powder coat system.

1. End rails (guards) that are telescoping and self-storing.

F. Understructure: Structural steel.

1. Finish: Manufacturer's standard rust-inhibiting finish.
2. Color: Manufacturer's standard.

G. Support Column Wheels: Nonmarring, soft, rubber-face wheel assembly under each support column.

1. Include wheels of size, number, and design required to support stands and operate smoothly without damaging the flooring surface, but no fewer than four per column or less than 4 inches in diameter and 1-1/2 inches wide.

H. Control Devices:

1. Wall Attached: control station, located within full view of each stand and its movement area.

I. Fasteners: Vibration proof, in manufacturer's standard size and material.

2.4 ACCESSORIES

A. Closure Panels and Void Fillers:

1. Aisle closures at foot level that produce flush vertical face at aisles when system is stored.
2. End panels covering exposed ends of stands in the stored position.
3. Panels at cutouts and truncations for accessible seating.
4. Rear fillers including supports for closing openings between top row and rear wall of adjoining construction.
5. Gap fillers for closing openings between stand units or between stand units and adjoining construction.

B. Signage:

1. Accessibility signs at each accessible space and accessible aisle seat.

2.5 MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Composite Wood Products: Verify products are made using ultra-low-emitting formaldehyde resins, as defined in CARB 93120, "Airborne Toxic Control Measure (ATCM) for Formaldehyde Emissions from Composite Wood Products," or are made with no added formaldehyde.

C. Composite Wood Products: Verify formaldehyde emission rates are not greater than the following when tested in accordance with ASTM D6007 or ASTM E1333:

1. Hardwood Plywood: 0.05 ppm.
2. MDF More Than 5/16 Inch Thick: 0.11 ppm.

D. Lumber: Kiln dried, surfaced four sides; southern pine complying with SPIB's "Standard Grading Rules for Southern Pine Lumber" for B & B finish (B and better) grade-of-finish requirements.

E. Plywood: PS 1 as standard with manufacturer.

F. Molded Plastic: High-density polyethylene; blow or injection molded, color-pigmented, textured, impact-resistant, with integral reinforcing ribs for attachment and anchoring points. Provide with UV inhibitors to retard fading.

2.6 FABRICATION

A. Fabricate telescoping stands to operate easily without special tools or separate fasteners unless otherwise indicated.

B. Round corners and edges of components and exposed fasteners to reduce snagging and pinching hazards.

C. Form exposed work with flat, flush surfaces, level and true in line.

D. Supports: Fabricate supports to withstand, without damage to components, the forces imposed by use of stands without failure or other conditions that might impair their usefulness.

1. Cantilever bench seat supports to produce toe space uninterrupted by vertical bracing.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install telescoping stands in accordance with ICC 300 and manufacturer's written instructions.

3.4 ADJUSTING

A. Adjust backrests so that they are at proper angles and aligned with each other in uniform rows.

B. Adjust hardware and moving parts to function smoothly, and lubricate, test, and adjust each telescoping stand unit to operate in accordance with manufacturer's written instructions.

C. Clean installed telescoping stands on exposed and semiexposed surfaces. Touch up factory-applied finishes or replace components as required to restore damaged or soiled areas.

D. Replace upholstery fabric damaged during installation or work of other trades.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate telescoping stands.

END OF SECTION 126600

SECTION 142400 - HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Hydraulic elevators.

1.3 DEFINITIONS

A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.

B. Service Elevator: A passenger elevator that is also used to carry freight.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for car enclosures; hoistway entrances; and operation, control, and signal systems.

B. Shop Drawings:

1. Include plans, elevations, sections, and large-scale details indicating service at each landing; machine room layout; coordination with building structure; relationships with other construction; and locations of equipment.
2. Include large-scale layout of car-control station.
3. Indicate maximum dynamic and static loads imposed on building structure at points of support as well as maximum and average power demands.

C. Samples for Initial Selection: For finishes involving color selection.

D. Samples for Verification: For exposed car, hoistway door and frame, and signal equipment finishes, 3-inch-square Samples of sheet materials and 4-inch lengths of running trim members.

1.6 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For elevator equipment, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Manufacturer Certificates: Signed by elevator manufacturer, certifying that hoistway, pit, and machine room layout and dimensions, as indicated on Drawings, and electrical service, as indicated and specified, are adequate for elevator system being provided.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.

1. Submit manufacturer's/installer's standard operation and maintenance manual, in accordance with ASME A17.1/CSA B44 including diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.

B. Inspection and Acceptance Certificates and Operating Permits: As required by the provisions of the NYC Building Code for normal, unrestricted elevator use.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials, components and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.10 COORDINATION

A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.

B. Furnish well casing and coordinate delivery with related excavation work.

C. Coordinate locations and dimensions of other work specified in other Sections that relates to hydraulic elevators, including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, pits, and machine rooms.

1.11 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
2. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 HYDRAULIC ELEVATORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on drawings as manufactured by Kone. Inc. or comparable product by one of the following:

1. Minnesota Elevator, Inc.
2. Otis Elevator Co.
3. Schindler Elevator Corp.
4. Or approved equal.

B. Source Limitations: Obtain elevators, including freight and electric traction passenger elevators specified in other Sections, from single manufacturer.

1. Major elevator components, including pump-and-tank units, plunger-cylinder assemblies, controllers, signal fixtures, door operators, car frames, cars, and entrances, are manufactured by single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.

B. Accessibility Standard: Comply with Section 407 in the United States Access Board's ADA-ABA Accessibility Guidelines and with ICC A117.1-2009.

C. Seismic Performance: Elevator system withstands the effects of earthquake motions determined according to ASCE/SEI 7 and complies with elevator seismic requirements in ASME A17.1/CSA B44.

1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."

2. Project Seismic Design Category: As indicated on drawings.
3. Elevator Component Importance Factor: 1.0 unless otherwise indicated.
4. Design earthquake spectral response acceleration short period (Sds) for Project is s required by the Building Code of the City of New York.
5. Provide earthquake equipment required by ASME A17.1/CSA B44.
6. Provide seismic switch required by ASCE/SEI 7.

2.3 ELEVATORS

A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturers' standard components are used, as included in standard elevator systems and as required for complete system.

B. Elevator Description:

1. Elevator Number(s): P1 and P2.

   a. Door Type (Front): 2 speed, left side open.
   b. Door Width (Front):54 inches.
   c. Door Height (Front): 6 inches.
   d. No. Car Button Panels: One.

2. Type: Holeless, beside-the-car, roped hydraulic, cylinder.
3. Rated Load: 5000 lb.
4. Rated Speed: 100 fpm.
5. Operation System: Selective-collective automatic operation.
6. Auxiliary Operations:

   a. Standby-power operation.
   b. Battery-powered lowering.
   c. Nuisance call cancel.
   d. Automatic operation of lights and ventilation fans.
   e. Independent service for all cars in group.

7. Security Features: Keyswitch operation.
8. Dual Car-Control Stations: Provide two car-control stations in each elevator; equip only one with required key switches if any.
9. Car Enclosures: As indicated on drawings.
10. Hoistway Entrances: As indicated on drawings.
11. Additional Requirements:

    a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, ASTM A480/A480M, No. 4 finish.
    b. Provide hooks for protective pads in and complete set(s) of full-height protective pads.

2.4 SYSTEMS AND COMPONENTS

A. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations.

1. Pump is submersible type with submersible squirrel-cage induction motor, and suspended inside oil tank from vibration isolation mountsoris tank-top-mounted type with fan-cooled, squirrel-cage induction motor, and is mounted on oil tank with vibration isolation mounts and enclosed in prime-painted steel enclosure lined with 1-inch- thick, glass-fiber insulation board.
2. Motor has wye-deltaorsolid-state starting.
3. Motor: 40 hp/ 208v.

B. Hydraulic Silencers: System has hydraulic silencer containing pulsation-absorbing material in blowout-proof housing at pump unit.

C. Piping: Size, type, and weight of piping as recommended by elevator manufacturer, with flexible connectors to minimize sound and vibration transmissions from power unit.

D. Hydraulic Fluid:

1. Hydraulic Fluid, Nontoxic and Biodegradable: Nontoxic, biodegradable, fire-resistant fluid, made from vegetable oil with antioxidant, anticorrosive, antifoaming, and metal-passivating additives, that is approved by elevator manufacturer for use with elevator equipment.

E. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.

F. Car Frame and Platform: Welded or bolted steel units.

G. Guides: Roller guides,Polymer-coated, nonlubricated sliding guides, or sliding guides with guide-rail lubricators. Provide guides at top and bottom of car frame.

2.5 OPERATION SYSTEMS

A. Provide manufacturer's standard microprocessor operation system as required to provide type of operation indicated.

B. Auxiliary Operations:

1. Single-Car Standby-Powered Lowering:

a. On activation of standby power, if car is at a floor, it remains at that floor, opens its doors, and shuts down. If car is between floors, it is lowered to a preselected floor, opens its doors, and shuts down. If car is below the preselected floor, it is lowered to the next lower floor, opens its doors, and shuts down.
b. On activation of standby power, car is lowered to the lowest floor, opens its doors, and shuts down.

2. Independent Service: Keyswitch in car-control station removes car from group operation and allows it to respond only to car calls. Key cannot be removed from keyswitch when car is in independent service. When in independent service, doors close only in response to door close button.
3. Automatic Operation of Lights and Fan: When elevator is stopped and unoccupied with doors closed, lighting, ventilation fan, and cab displays are de-energized after 5 minutes and are re-energized before car doors open.

C. Security Features: Security features do not affect emergency firefighters' service.

1. Keyswitch Operation: Push buttons are activated and deactivated by security keyswitches at car-control stations. Key is removable in either position.
2. Car-to-Lobby Feature: Feature, activated by keyswitch at main lobby, that causes car to return immediately to lobby and open doors for inspection. On deactivation by keyswitch, calls registered before keyswitch activation are completed and normal operation is resumed.

2.6 DOOR-REOPENING DEVICES

A. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door-reopening device, a loud buzzer sounds and doors begin to close at reduced kinetic energy.

2.7 CAR ENCLOSURES

A. Provide enameled- or powder-coated-steel car enclosures to receive removable wall panels, with removable car roof, access doors, power door operators, and ventilation.

1. Provide standard railings complying with ASME A17.1/CSA B44 on car tops where required by ASME A17.1/CSA B44.

B. Materials and Finishes: Manufacturer's standards, but not less than the following:

1. Subfloor: Exterior, C-C Plugged grade plywood, not less than 7/8-inch nominal thickness.
2. Floor Finish: Tile as indicated on drawings.
3. Stainless Steel Wall Panels: Flush, formed-metal construction; fabricated from stainless steel sheet.
4. Fabricate car with recesses and cutouts for signal equipment.
5. Fabricate car door frame integrally with front wall of car.
6. Stainless Steel Doors: Flush, hollow-metal construction; fabricated from stainless steel sheet.
7. Sight Guards: Provide sight guards on car doors.
8. Sills: Extruded or machined metal, with grooved surface, 1/4 inch thick.
9. Ceiling: Stainless steel sheet flush panels, with LED downlights in each panel as indiacted on drawings. Align ceiling panel joints with joints between wall panels.

2.8 HOISTWAY ENTRANCES

A. Hoistway Entrance Assemblies: Manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile accommodate hoistway wall construction.

B. Fire-Rated Hoistway Entrance Assemblies: Door-and-frame assemblies comply with NFPA 80 and be listed and labeled by a qualified testing and inspecting agency based on testing at as close-to-neutral pressure as possible according to NFPA 252orUL 10B.

1. Fire-Protection Rating: 1-1/2 hours with 30-minute temperature rise of 450 deg F unless otherwise indicated.

C. Materials and Fabrication: Manufacturer's standards, but not less than the following:

1. Primed or Powder-Coated-Steel Frames: Formed from cold- or hot-rolled steel sheet. Provide with factory-applied, rust-resistant primer or powder coating for field painting.
2. Star of Life Symbol: Identify emergency elevators with star of life symbol, not less than 3 inches high, on both jambs of hoistway door frames.
3. Enameled- or Powder-Coated-Steel Doors: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel or powder-coat finish; colors as selected by Commissioner from manufacturer's full range.
4. Sight Guards: Provide sight guards on doors matching door edges.
5. Sills: Extruded or machined metal, with grooved surface, 1/4 inch thick.
6. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M.

2.9 SIGNAL EQUIPMENT

A. Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Provide vandal-resistant buttons and lighted elements illuminated with LEDs.

B. Swing-Return Car-Control Stations: Provide car-control stations mounted on rear of hinged return panel adjacent to car door and with buttons, switches, controls, and indicator lights projecting through return panel but substantially flush with face of return panel.

1. Mark buttons and switches for function. Use both tactile symbols and Braille.
2. Provide "No Smoking" sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics as required by heBuilding Code

C. Emergency Communication System: Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

D. Car Position Indicator: Provide digital-type car position indicator, located above car door or above car-control station. Also, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served. Include travel direction arrows if not provided in car-control station.

E. Hall Push-Button Stations: Provide one hall push-button station at each landing.

1. Provide manufacturer's standard wall-mounted units.
2. Equip units with buttons for calling elevator and for indicating applicable direction of travel.
3. Provide telephone jack in each unit for firefighters' two-way telephone communication service. \ "

F. Hall Lanterns: Units with illuminated arrows; however, provide single arrow at terminal landings. Provide the following:

1. Units mounted in both car door jambs; may be used only for single elevators or for two-car groups.

G. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.

1. At manufacturer's option, audible signals may be placed on cars.

H. Hall Position Indicators: Provide digital-display-type position indicators, located above each hoistway entrance at ground floor.

I. Fire-Command-Center Annunciator Panel: Provide panel containing illuminated position indicators for each elevator, clearly labeled with elevator designation; include illuminated signal that indicates when elevator is operational and when it is at the designated emergency return level with doors open. Provide standby-power elevator selector switch(es), as required by ASME A17.1/CSA B44, adjacent to position indicators. Provide illuminated signal that indicates when normal power supply has failed.

J. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics, indicating that in case of fire, elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

2.10 FINISH MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, commercial steel, Type B, exposed, matte finish.

B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, commercial steel, Type B, pickled.

C. Stainless Steel Sheet: ASTM A240/A240M, Type 304.

D. Textured (Etched) Stainless Steel Sheet: ASTM A240/A240M, Type 304, with embossed texture rolled into exposed surface.

1. Metal surface is satin polished after texturing.

E. Stainless Steel Bars: ASTM A276/A276M, Type 304.

F. Stainless Steel Tubing: ASTM A554, Grade MT 304.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify critical dimensions and examine supporting structure and other conditions under which elevator work is to be installed.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install cylinder plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor and braced at intervals as needed to maintain alignment. Anchor cylinder guides at spacing needed to maintain alignment and avoid overstressing guides.

B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS workmanship and welding operator qualification standards.

C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.

D. Lubricate operating parts of systems as recommended by manufacturers.

E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

F. Leveling Tolerance: 1/4 inch, up or down, regardless of load and travel direction.

G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

H. Locate hall signal equipment for elevators as follows unless otherwise indicated:

1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
2. Place hall lanterns either above or beside each hoistway entrance.
3. Mount hall lanterns at a minimum of 72 inches above finished floor.

3.4 FIELD QUALITY CONTROL

A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.

B. Advise Commissioner in advance of dates and times that tests are to be performed on elevators.

3.5 PROTECTION

A. Temporary Use: Limit temporary use for construction purposes to one elevator. Comply with the following requirements for each elevator used for construction purposes:

1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
2. Provide strippable protective film on entrance and car doors and frames.
3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.

4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
5. Do not load elevators beyond their rated weight capacity.
6. Engage elevator Installer to provide full maintenance service. Include repair or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to operate and adjust elevator(s).

B. Check operation of each elevator with City of New York's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION 142400

SECTION 210500 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. The Work of this Section includes:

1. Escutcheons.

1.3 DEFINITIONS

A. Existing Piping to Remain: Existing piping that is not to be removed and that is not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For each type of product, excluding motors which are included in Part 1 of the fire-suppression equipment Sections.

   a. Include construction details, material descriptions, and dimensions of components.
   b. Include operating characteristics and furnished accessories.

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.7 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. BrassCraft Manufacturing Co.; a Masco company.
2. Dearborn Brass.
3. Jones Stephens Corp.
4. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF PIPE LOOPS AND SWING CONNECTIONS

A. Install pipe loops and offsets in accordance with NFPA 13 requirements for expansion and contraction compensation.

3.3 INSTALLATION OF SLEEVES, GENERAL

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using silicone sealant, seal space outside of sleeves in floors/slabs/walls without sleeve-seal system. Select to maintain fire-resistance of floor/slab/wall.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants that joint sealant manufacturer's literature indicates is appropriate for size, depth, and location of joint.

E. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

3.4 INSTALLATION OF ESCUTCHEONS

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

3.5 FIELD QUALITY CONTROL

A. Sleeves and Sleeve Seals:

1. Perform the following tests and inspections:

a. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.
b. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.

2. Prepare test and inspection reports.

B. Escutcheons:

1. Using new materials, replace broken and damaged escutcheons and floor plates.

3.6 ESCUTCHEONS APPLICATION

A. Escutcheons for New Piping and Relocated Existing Piping:

1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.

B. Install floor plates for piping penetrations of equipment room floors.

C. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping and Relocated Existing Piping: One piece, floor plate.
2. Existing Piping: Split floor plate.

END OF SECTION 210500

SECTION 210523 - GENERAL-DUTY VALVES FOR WATER-BASED FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Two-piece ball valves with indicators.
2. Bronze butterfly valves with indicators.
3. Check valves.
4. Bronze OS&Y gate valves.
5. Iron OS&Y gate valves.
6. Trim and drain valves.

1.3 DEFINITIONS

A. OS&Y: Outside screw and yoke.

B. SBR: Styrene-butadiene rubber.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and weld ends.
3. Set valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

D. Protect flanges and specialties from moisture and dirt.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of valve from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. UL Listed: Valves must be listed in UL's "Online Certifications Directory" under the headings listed below and must bear UL mark:

a. Fire Main Equipment: HAMV
b. Ball Valves, System Control: HLUG - Level 3
c. Butterfly Valves: HLXS - Level 3
d. Check Valves: HMER - Level 3
e. Gate Valves: HMRZ - Level 3

2. Sprinkler System and Water Spray System Devices: VDGT - Main Level

a. Valves, Trim and Drain: VQGU - Level 1

B. FM Global Approved: Valves must be listed in its "Approval Guide," under the headings listed below:

1. Automated Sprinkler Systems:

a. Indicator posts.
b. Valves.

1) Gate valves.
2) Check valves
3) Miscellaneous valves.

C. ASME Compliance:

1. ASME B1.20.1 for threads for threaded-end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B31.9 for building services piping valves.

D. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

E. NFPA Compliance for Valves:

1. Comply with NFPA 13, NFPA 14, NFPA 20, and NFPA 24.

F. Valve Pressure Ratings: Not less than the minimum pressure rating indicated or higher, as required by system pressures.

G. Valve Sizes: Same as upstream piping unless otherwise indicated.

H. Valve Actuator Types:

1. Worm-gear actuator with handwheel for quarter-turn valves, except for trim and drain valves.
2. Handwheel: For other than quarter-turn trim and drain valves.
3. Handlever: For quarter-turn trim and drain valves NPS 2 and smaller.

2.3 TWO-PIECE BALL VALVES WITH INDICATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ames Fire & Waterworks; A WATTS Brand.
2. NIBCO INC.
3. Victaulic Company.
4. Or approved equal.

B. Description:

1. UL 1091, except with ball instead of disc and FM Global approved for indicating valves (butterfly or ball type), Class Number 1112.
2. Minimum Pressure Rating: 175 psig.
3. Body Design: Two piece.
4. Body Material: Forged brass or bronze.
5. Port Size: Full or standard.
6. Seats: PTFE.
7. Stem: Bronze or stainless steel.
8. Ball: Chrome-plated brass.
9. Actuator: Worm gear
10. Supervisory Switch: Internal or external.
11. End Connections for Valves NPS 1 through NPS 2: Threaded ends.
12. End Connections for Valves NPS 2-1/2: Grooved ends.

2.4 CHECK VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Fire Protection Products, Inc.
2. Reliable Automatic Sprinkler Co., Inc. (The).
3. Zurn Industries, LLC.
4. Or approved equal.

2.5 BRONZE OS&Y GATE VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Milwaukee Valve Company.
2. NIBCO INC.
3. Zurn Industries, LLC.
4. Or approved equal.

B. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig.
3. Body and Bonnet Material: Bronze or brass.
4. Wedge: One-piece bronze or brass.
5. Wedge Seat: Bronze.
6. Stem: Bronze or brass.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Threaded.

2.6 IRON OS&Y GATE VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Clow Valve Company; a subsidiary of McWane, Inc.
2. NIBCO INC.
3. Victaulic Company.
4. Or approved equal.

2.7 TRIM AND DRAIN VALVES

A. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Apollo Flow Controls; Conbraco Industries, Inc.
b. FNW; Ferguson Enterprises, Inc.

c. Metso Automation USA Inc.
d. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.3 INSTALLATION, GENERAL

A. Comply with requirements in the following Sections for specific valve-installation requirements and applications:

1. Section 211000 "Water-Based Fire-Suppression Systems" for application of valves in fire-suppression standpipes; wet-pipe, fire-suppression sprinkler systems; and dry-pipe, fire-suppression sprinkler systems.
2. Section 331415 "Site Water Distribution Piping" for application of valves in fire-suppression water-service piping.

B. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply, except from fire-department connections. Install permanent identification signs, indicating portion of system controlled by each valve.

C. Install double-check valve assembly in each fire-protection water-supply connection.

D. Install valves having threaded connections with unions at each piece of equipment arranged to allow easy access, service, maintenance, and equipment removal without system shutdown. Provide separate support where necessary.

E. Install valves in horizontal piping with stem at or above the pipe center.

F. Install valves in position to allow full stem movement.

G. Install valve tags. Comply with requirements in Section 210553 "Identification for Fire-Suppression Piping and Equipment" for valve tags and schedules and signs on surfaces concealing valves; and the NFPA standard applying to the piping system in which valves are installed. Install permanent identification signs indicating the portion of system controlled by each valve.

END OF SECTION 210523

SECTION 210529 - HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Fastener systems.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 210548 "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment" for vibration isolation devices and seismic restraints.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

C. Pipe Welding Qualifications: Qualify procedures and operators according to 2015 ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for fire-suppression piping and equipment must withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

B. NFPA Compliance: Comply with NFPA 13 NFPA 13R.

C. UL Compliance: Comply with UL 203.

2.2 MATERIALS

A. Aluminum: ASTM B 221.

B. Carbon Steel: ASTM A 1011/A 1011M.

C. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

D. Stainless Steel: ASTM A 240/A 240M.

E. Grout: ASTM C 1107/C 1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout, suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 APPLICATION

A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.

3.3 INSTALLATION OF HANGER AND SUPPORT

A. Metal Pipe-Hanger Installation: Comply with installation requirements of approvals and listings. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete, after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual. Install in accordance with approvals and listings.
2. Install mechanical-expansion anchors in concrete, after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions. Install in accordance with approvals and listings.

C. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

D. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

E. Install lateral bracing with pipe hangers and supports to prevent swaying.

F. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms, and install reinforcing bars through openings at top of inserts.

G. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

H. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

I. Insulated Piping:

1. Attach clamps and spacers to piping.

a. Piping Operating Above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating Below Ambient Air Temperature: Use thermal hanger-shield insert with clamp sized to match OD of insert.
c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39 protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. MSS SP-58, Type 39 Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields must span an arc of 180 degrees.

    a. MSS SP-58, Type 40 Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    b. NPS 4: 12 inches long and 0.06 inch thick.
    c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
    d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
    e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal Hanger Shields: Install with insulation of same thickness as piping insulation.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections, so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

A. Touchup:

1. Clean field welds and abraded, shop-painted areas. Paint exposed areas immediately after erecting hangers and supports. Use same materials as those used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

a. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A 780/A 780M.

3.7 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with NFPA requirements for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finishes.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel or corrosion-resistant attachments for hostile environment applications.

G. Use copper-plated pipe hangers and stainless-steel attachments for copper piping and tubing.

H. Use thermal hanger-shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Steel Pipe Clamps (MSS Type 4): For suspension of NPS 1/2 to NPS 24 if little or no insulation is required.
3. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
4. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
5. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.

6. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
7. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
8. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
9. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Comply with NFPA requirements.

L. Building Attachments: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable-Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. C-Clamps (MSS Type 23): For structural shapes.
3. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

M. Saddles and Shields: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.

N. Comply with NFPA requirements for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

O. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

P. Use instead of building attachments where required in concrete construction.

END OF SECTION 210529

SECTION 210548 - VIBRATION AND SEISMIC CONTROLS FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Elastomeric isolation pads.
2. Elastomeric isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Elastomeric hangers.
5. Snubbers.
6. Restraints - rigid type.
7. Restraints - cable type.
8. Restraint accessories.
9. Post-installed concrete anchors.
10. Concrete inserts.

1.3 DEFINITIONS

A. Designated Seismic System: A fire-suppression component that requires design in accordance with ASCE/SEI 7, Ch. 13 and for which the Component Importance Factor is greater than 1.0.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Include load rating for each wind-load-restraint fitting and assembly.
3. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device and seismic-restraint component.

4. Annotate types and sizes of seismic restraints and accessories, complete with listing markings or report numbers and load rating in tension and compression as evaluated by ICC-ES product listing, UL product listing, FM Approvals, an evaluation service member of ICC-ES.
5. Annotate to indicate application of each product submitted and compliance with requirements.
6. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

B. Shop Drawings:

1. Detail fabrication and assembly of equipment bases.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Engineering Services Submittal:

1. For each seismic-restraint device, including seismic-restrained mounting, pipe-riser resilient support, snubber, seismic restraint, seismic-restraint accessory, and concrete anchor and insert that is required by this Section or is indicated on Drawings, submit the following:

    a. Seismic- and Wind-Load-Restraint Selection: Select seismic restraints complying with performance requirements, design criteria, and analysis data.
    b. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, and seismic loads. Include certification by licensed in the State of New York engineer that riser system was examined for excessive stress and that none exists.
    c. Post-Installed Concrete Anchors and Inserts: Include calculations showing anticipated seismic loads. Include certification that device is approved by an NRTL for seismic reinforcement use.
    d. Seismic Design Calculations: Submit all input data and loading calculations prepared under "Seismic Design Calculations" Paragraph in "Performance Requirements" Article.
    e. Wind-Load Design Calculations: Submit all static and dynamic loading calculations prepared under "Wind-Load Design Calculations" in "Performance Requirements" Article.
    f. Qualified Professional Engineer: All engineering services submittals for seismic calculations are to be signed and sealed by qualified New York State licensed professional engineer responsible for their preparation.

2. Seismic- and Wind-Load-Restraint Detail Drawing:

    a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
    b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
    c. Coordinate seismic restraint details with wind-load restraint details required for equipment mounted outdoors. Comply also with requirements in other Sections for equipment mounted outdoors.

3. Product Listing, Preapproval, and Evaluation Documentation: By an evaluation service member of ICC-ES, UL, FM Approvals, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

4. All engineering services submittals for seismic-restraint detail Drawings are to be signed and sealed by qualified licensed in the State of New York engineer responsible for their preparation.

D. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, and seismic loads. Include certification that riser system was examined for excessive stress and that none exists.

E. Coordination Drawings: Show coordination of seismic bracing for fire-suppression piping and equipment with other systems and equipment in the vicinity, including other supports and restraints, if any.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Field quality-control reports.

D. Seismic Qualification Data: Provide special certification for designated seismic systems as indicated in ASCE/SEI 7-05, ASCE/SEI 7-10, ASCE/SEI 7-16, Paragraph 13.2.2, "Special Certification Requirements for Designated Seismic Systems" for all Designated Seismic Systems identified as such on Drawings or in the Specifications.

1. Provide equipment manufacturer's written certification for each designated active fire-suppression system seismic device and system, stating that it will remain operable following the design earthquake. Certification must be based on requirements of ASCE/SEI 7 and AHRI 1270, including shake table testing per ICC-ES AC156 or a similar nationally recognized testing standard procedure or experience data as permitted by ASCE/SEI 7-05, ASCE/SEI 7-10, ASCE/SEI 7-16.
2. Provide equipment manufacturer's written certification that components with hazardous contents maintain containment following the design earthquake by methods required in ASCE/SEI 7-05, ASCE/SEI 7-10, ASCE/SEI 7-16.
3. Submit evidence demonstrating compliance with these requirements for approval to review and acceptance by a licensed in the State of New York engineer.
4. The following fire-suppression systems and components are Designated Seismic Systems and require written special certification of seismic qualification by manufacturer:

   a. Wet Sprinkler system.

   b. Fire Standpipe system.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Seismic-Restraint Device Load Ratings: Devices to be tested and rated in accordance with applicable code requirements. Devices to be listed by a nationally recognized third party that requires periodic follow-up inspections and has a listing directory available to the public. Provide third-party listing by one or more of the following: ICC-ES product listing, UL product listing, FM Approvals an evaluation service member of ICC-ES.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York as defined in DDC General Conditions, to design seismic control system.

1. Seismic Performance: Equipment must be designed and secured to withstand the effects of earthquake motions determined in accordance with NFPA 13 and ASCE/SEI 7-05, ASCE/SEI 7-10 and ASCE/SEI 7-16.
2. Wind-Load Performance: Equipment must be designed and secured to withstand the effects of high wind events determined in accordance with ASCE/SEI 7-05, ASCE/SEI 7-10 and ASCE/SEI 7-16.

B. Seismic Design Calculations:

1. Perform calculations to obtain force information necessary to properly select seismic-restraint devices, fasteners, and anchorage. Perform calculations using methods acceptable to NYC BC 2022 and as presented in NFPA 13 and ASCE/SEI 7-05, ASCE/SEI 7-10 including supplement No. 1 ASCE/SEI 7-16. Where "ASCE/SEI 7" is used throughout this Section, it is to be understood that the edition referred to in this subparagraph is the edition intended as reference throughout the Section Text.

a. Data indicated below to be determined by Contractor's Professional Engineer must be obtained by Contractor and must be included in individual component submittal packages.
b. Coordinate seismic design calculations with wind-load calculations for equipment mounted outdoors. Comply with requirements in other Sections in addition to those in this Section for equipment mounted outdoors.
c. Building Occupancy Category.
d. Building Risk Category.
e. Building Site Classification.

2. **C**alculation Factors, ASCE/SEI 7-16, Ch. 13 - Seismic Design Requirements for Nonstructural Components: All section, paragraph, equation, and table numbers refer to ASCE/SEI 7-16 unless otherwise noted.

a. Horizontal Seismic Design Force F_p: Value is to be calculated by Contractor's Professional Engineer using Equation 13.3-1. Factors below must be obtained for this calculation.

1) S_{DS} = Spectral Acceleration. Value applies to all components on Project.
2) a_p = Component Amplification Factor: See Drawing Schedule for each component.
3) I_p = Component Importance Factor: See Drawing Schedule for each component.

4) W_p = Component Operating Weight: For each component. Obtain by Contractor's Professional Engineer from each component submittal.
5) R_p = Component Response Modification Factor: See Drawing Schedule for each component.
6) z = Height in Structure of Point of Attachment of Component for Base: Determine from Project Drawings for each component by Contractor's Professional Engineer. For items at or below the base, "z" is to be taken as zero.
7) h = Average Roof Height of Structure for Base: Determine from Project Drawings by Contractor's Professional Engineer.

b. Vertical Seismic Design Force: Calculated by Contractor's Professional Engineer using method explained in ASCE/SEI 7-16, Paragraph 13.3.1.2.

c. Seismic Relative Displacement D_{pl}: Calculated by Contractor's Professional Engineer using methods explained in ASCE/SEI 7-16, Paragraph 13.3.2. Factors below must be obtained for this calculation:

1) D_p = Relative Seismic Displacement that Each Component Must Be Designed to Accommodate: Calculated by Contractor's Professional Engineer in accordance with ASCE/SEI 7-16, Paragraph 13.3.2.
2) I_e = Structure Importance Factor. Value applies to all components on Project.
3) δ_{xA} = Deflection at Building Level x of Structure A: See Drawing Schedule for each component.
4) δ_{yA} = Deflection at Building Level y of Structure A: See Drawing Schedule for each component.
5) δ_{yB} = Deflection at Building Level y of Structure B: See Drawing Schedule for each component.
6) h_x = Height of Level x to which Upper Connection Point Is Attached: Determine for each component by Contractor's Professional Engineer from Project Drawings and manufacturer's data.
7) h_y = Height of Level y to which Upper Connection Point Is Attached: Determine for each component by Contractor's Professional Engineer from Project Drawings and manufacturer's data.
8) Δ_{aA} = Allowable Story Drift for Structure A: See Drawing Schedules for each component.
9) Δ_{aB} = Allowable Story Drift for Structure B: See Drawing Schedules for each component.
10) h_{sx} = Story Height Used in the Definition of the Allowable Drift: See Drawings Schedules for each component.

d. Component Fundamental Period T_p: Calculated by Contractor's Professional Engineer using methods explained in ASCE/SEI 7-16, Paragraph 13.3.3. Factors below must be obtained for this calculation:

1) W_p = Component Operating Weight: Determined by contractor from Project Drawings and manufacturer's data.
2) g = Gravitational Acceleration: 32.17 fps2.
3) K_p = Combined Stiffness of Component, Supports, and Attachments: Determined by Contractor's Professional engineer furnishing engineering services.

3. Calculation Factors, ASCE/SEI 7-10, Ch. 13 - Seismic Design Requirements for Nonstructural Components: All section, paragraph, equation, and table numbers refer to ASCE/SEI 7-10 unless otherwise noted.

   a. Horizontal Seismic Design Force F_p: Calculated by Contractor's Professional Engineer by ASCE/SEI 7-10, Equation 13.3-1. Factors below must be obtained for this calculation.

      1) S_{DS} = Spectral Acceleration. Value applies to all components on Project.
      2) a_p = Component Amplification Factor: See Drawing Schedule for each component.
      3) I_p = Component Importance Factor: See Drawing Schedule for each component.
      4) W_p = Component Operating Weight: For each component. Obtain by Contractor's Professional Engineer from equipment submittal.
      5) R_p = Component Response Modification Factor: See Drawing Schedule for each component.
      6) z = Height in Structure of Point of Attachment of Component for Base: Determined from Project Drawings for each component by Contractor. For items at or below the base, "z" is to be taken as zero.
      7) h = Average Roof Height of Structure for Base: Determine from Project Drawings by Contractor's Professional Engineer.

   b. Vertical Seismic Design Force: Calculate by Contractor's Professional Engineer using method explained in ASCE/SEI 7-10, Paragraph 13.3.1.

   c. Seismic Relative Displacement D_{pl}: Calculate by Contractor's Professional Engineer using methods explained in ASCE/SEI 7-10, Paragraph 13.3.2. Factors below must be obtained for this calculation:

      1) D_p = Relative Seismic Displacement that Each Component Must Be Designed to Accommodate: Calculate by Contractor's Professional Engineer in accordance with ASCE/SEI 7-10, Paragraph 13.3.2.
      2) I_e = Structure Importance Factor. Value applies to all components on Project.
      3) δ_{xA} = Deflection at Building Level x of Structure A: See Drawing Schedule for each component.
      4) δ_{yA} = Deflection at Building Level y of Structure A: See Drawing Schedule for each component.
      5) δ_{yB} = Deflection at Building Level y of Structure B: See Drawing Schedule for each component.
      6) h_x = Height of Level x to which Upper Connection Point Is Attached: Determine for each component by Contractor's Professional Engineer from Project Drawings and manufacturer's data.
      7) h_y = Height of Level y to which Upper Connection Point Is Attached: Determine for each component by Contractor's Professional Engineer from Project Drawings and manufacturer's data.
      8) Δ_{aA} = Allowable Story Drift for Structure A: See Drawing Schedule for each component.
      9) Δ_{aB} = Allowable Story Drift for Structure B: See Drawing Schedule for each component.
      10) h_{sx} = Story Height Used in the Definition of the Allowable Drift Δ_a: See Drawing Schedule for each component.

4. Calculation Factors, ASCE/SEI 7-05, Ch. 13 - Seismic Design Requirements for Nonstructural Components: All section, paragraph, equation, and table numbers refer to ASCE/SEI 7-05 unless otherwise noted.

   a. Horizontal Seismic Design Force F_p: Calculated by Contractor's Professional Engineer by ASCE/SEI 7-05, Equation 13.3-1. Factors below must be obtained for this calculation:

      1) S_{DS} = Spectral Acceleration. Value applies to all components on Project.
      2) a_p = Component Amplification Factor: See Drawing Schedule for each component.
      3) I_p = Component Importance Factor: See Drawing Schedule for each component.
      4) W_p = Component Operating Weight: Obtain by Contractor's Professional Engineer for each component from component submittal.
      5) R_p = Component Response Modification Factor: See Drawing Schedule for each component.
      6) z = Height in Structure of Point of Attachment of Component for Base: Determine by Contractor's Professional Engineer for each component from Project Drawings. For items at or below the base, "z" is to be taken as zero.
      7) h = Average Roof Height of Structure for Base: Determine by Contractor's Professional Engineer from Project Drawings.

   b. Vertical Seismic Design Force: Calculated by Contractor's Professional Engineer using method explained in ASCE/SEI 7-05, Paragraph 13.3.1.

   c. Seismic Relative Displacement D_p: Calculated by Contractor's Professional Engineer using methods explained in ASCE/SEI 7-05, Paragraph 13.3.2. Factors below must be obtained for this calculation:

      1) δ_{xA} = Deflection at Building Level x of Structure A: See Drawing Schedule for each component.
      2) δ_{yA} = Deflection at Building Level y of Structure A: See Drawing Schedule for each component.
      3) δ_{yB} = Deflection at Building Level y of Structure B: See Drawing Schedule for each component.
      4) h_x = Height of Level x to which Upper Connection Point Is Attached: Determine for each component by Contractor's Professional Engineer from Project Drawings and manufacturer's data.
      5) h_y = Height of Level y to which Upper Connection Point Is Attached: Determine for each component by Contractor's Professional Engineer from Project Drawings and manufacturer's data.
      6) Δ_{aA} = Allowable Story Drift for Structure A: See Drawing Schedule for each component.
      7) Δ_{aB} = Allowable Story Drift for Structure B: See Drawing Schedule for each component.
      8) h_{sx} = Story Height Used in the Definition of the Allowable Drift Δ_a.: See Drawing Schedule for each component.

C. Fire/Smoke Resistance: Seismic-restraint devices that are not constructed of ferrous metals must have a maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested by an NRTL in accordance with ASTM E84 or UL 723, and be so labeled.

D. Component Supports:

1. Load ratings, features, and applications of all reinforcement components must be based on testing standards of a nationally recognized testing agency.
2. All component support attachments must comply with force and displacement resistance requirements of ASCE/SEI 7-05 Section 13.6, ASCE/SEI 7-10 Section 13.6, and ASCE/SEI 7-16 Section 13.6.

2.2 ELASTOMERIC ISOLATION PADS

A. Elastomeric Isolation Pads.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Ace Mountings Co., Inc.
    b. CADDY; a brand of nVent.
    c. Kinetics Noise Control, Inc.
    d. Or approved equal.

2. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
3. Size: Factory or field cut to match requirements of supported equipment.
4. Pad Material: Oil and water resistant with elastomeric properties. Neoprene rubber, silicone rubber, or other elastomeric material.
5. Surface Pattern: Smooth, ribbed, or waffle pattern.
6. Infused nonwoven cotton or synthetic fibers.
7. Load-bearing metal plates adhered to pads.
8. Sandwich-Core Material: Resilient and elastomeric.

    a. Surface Pattern: Smooth, ribbed, or waffle pattern.
    b. Infused nonwoven cotton or synthetic fibers.

2.3 ELASTOMERIC ISOLATION MOUNTS

A. Double-Deflection, Elastomeric Isolation Mount.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CADDY; a brand of nVent.
    b. Vibration Eliminator Co., Inc.
    c. Vibration Isolation.
    d. Or approved equal.

2. Mounting Plates:

    a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
    b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.

3. Elastomeric Material: Molded, oil- and water-resistant neoprene rubber, silicone rubber, or other elastomeric material.

2.4 RESTRAINED ELASTOMERIC ISOLATION MOUNTS

A. Restrained Elastomeric Isolation Mounts.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Isolation Technology, Inc.
   b. Vibration Eliminator Co., Inc.
   c. Vibration Mountings & Controls, Inc.
   d. Or approved equal.

2. Description: All-directional isolator with seismic restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.

   a. Housing: Cast-ductile iron or welded steel.
   b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.5 ELASTOMERIC HANGERS

A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. CADDY; a brand of nVent.
   b. Vibration Isolation.
   c. Vibration Management Corp.
   d. Or approved equal.

2. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
3. Damping Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel-to-steel contact.

2.6 SNUBBERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CADDY; a brand of nVent.
2. Kinetics Noise Control, Inc.
3. Mason Industries, Inc.
4. Vibration Management Corp.
5. Or approved equal.

B. Description: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.

1. Post-Installed Concrete Anchor Bolts: Secure to concrete surface with post-installed concrete anchors. Anchors to be seismically prequalified in accordance with ACI 355.2 testing and designated in accordance with ACI 318-08 Appendix D for 2009 IBC ACI 318-11 Appendix D for 2012 IBC ACI 318-14 Ch. 17 for 2015 or 2018 IBC.
2. Preset Concrete Inserts: Seismically prequalified in accordance with ICC-ES AC446 testing.
3. Anchors in Masonry: Design in accordance with TMS 402.
4. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
5. Resilient Cushion: Maximum 1/4-inch air gap, and minimum 1/4 inch thick.

2.7 RESTRAINTS - RIGID TYPE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. B-line, an Eaton business.
2. CADDY; a brand of nVent.
3. California Dynamics Corporation.
4. Vibration Mountings & Controls, Inc.
5. Or approved equal.

B. Description: Shop- or field-fabricated bracing assembly made of AISI S110-07-S1 slotted steel channels, ANSI/ASTM A53/A53M steel pipe as per NFPA 13, or other rigid steel brace member. Includes accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.8 RESTRAINTS - CABLE TYPE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. B-line, an Eaton business.
2. CADDY; a brand of nVent.
3. Vibration Mountings & Controls, Inc.
4. Or approved equal.

B. Seismic-Restraint Cables: ASTM A1023/A12023M galvanized or ASTM A603 galvanized-steel ASTM A492 stainless steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for seismic restraining cable service; with fittings attached by means of poured socket, swaged socket or mechanical (Flemish eye) loop.

C. Restraint cable assembly with cable fittings must comply with ASCE/SEI 19. All cable fittings and complete cable assembly must maintain the minimum cable breaking force. U-shaped cable clips and wedge-type end fittings do not comply and are unacceptable.

2.9 RESTRAINT ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CADDY; a brand of nVent.
2. Loos & Co.
3. TOLCO.
4. Or approved equal.

B. Hanger-Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections Reinforcing steel angle clamped to hanger rod. Non-metallic stiffeners are unacceptable.

C. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid restraints restraint cables.

D. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

E. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.

F. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.10 POST-INSTALLED CONCRETE ANCHORS

A. Mechanical Anchor Bolts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. B-line, an Eaton business.
b. Powers Fasteners.
c. Unistrut; Part of Atkore International.
d. Or approved equal.

2. Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength for anchor and as tested according to ASTM E488/E488M.

B. Adhesive Anchor Bolts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hilti, Inc.
b. Mason Industries, Inc.
c. Powers Fasteners.
d. Or approved equal.

2. Drilled-in and capsule anchor system containing PVC or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E488/E488M.

C. Provide post-installed concrete anchors that have been prequalified for use in seismic applications. Post-installed concrete anchors must comply with all requirements of ASCE/SEI 7-05, Ch. 13, ASCE/SEI 7-10, Ch. 13 and ASCE/SEI 7-16 Ch. 13.

1. Prequalify post-installed anchors in concrete in accordance with ACI 355.2 or other approved qualification testing procedures.
2. Prequalify post-installed anchors in masonry in accordance with approved qualification procedures.

D. Expansion-type anchor bolts are not permitted for equipment in excess of 10 hp that is not vibration isolated.

1. Undercut expansion anchors are permitted.

2.11 CONCRETE INSERTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. B-line, an Eaton business.
2. Hilti, Inc.
3. Mason Industries, Inc.
4. Or approved equal.

B. Provide preset concrete inserts that are seismically prequalified in accordance with ICC-ES AC466 testing.

C. Comply with ANSI/MSS SP-58.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and equipment to receive vibration isolation, and seismic control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an evaluation service member of ICC-ES.

B. Hanger-Rod Stiffeners: Install where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength is adequate to carry calculated static, and seismic loads within specified loading limits.

3.4 INSTALLATION OF VIBRATION CONTROL, WIND-LOAD-RESTRAINT, AND SEISMIC-RESTRAINT DEVICES

A. Provide vibration-control devices for systems and equipment where indicated in Equipment Schedules or Fire-Suppression Vibration Isolation, Seismic, and Wind-Load-Restraint Schedule, where indicated on Drawings, or where the Specifications indicate they are to be installed on specific equipment and systems.

B. Provide seismic-restraint devices for systems and equipment where indicated in Equipment Schedules or Vibration Isolation, Seismic, and Wind-Load-Restraint Schedules, where indicated on Drawings, where the Specifications indicate they are to be installed on specific equipment and systems, and where required by applicable codes.

C. Coordinate location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete."

D. Installation of vibration isolators, and seismic restraints must not cause any stresses, misalignment, or change of position of equipment or piping.

E. Comply with installation requirements of NFPA 13 for installation of all seismic-restraint devices.

F. Comply with requirements in Section 077200 "Roof Accessories" for installation of equipment supports and roof penetrations.

G. Equipment Restraints:

1. Install snubbers on fire-suppression equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
3. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES that provides required submittals for component.

H. Piping Restraints:

1. Comply with all requirements in NFPA 13.
2. Design piping sway bracing in accordance with NFPA 13.

a. Maximum spacing of all sway bracing to be no greater than indicated in NFPA 13.
b. Design loading of all sway bracing not to exceed values indicated in NFPA 13.

I. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES that provides required submittals for component.

J. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

K. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

L. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

M. Post-Installed Concrete Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the Commissioner if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Mechanical-Type Anchor Bolts: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors are to be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive-Type Anchor Bolts: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless steel anchors for exterior applications.

3.5 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross structural seismic joints and other points where differential movement may occur, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Section 211000 "Water-Based Fire-Suppression Systems" for piping flexible connections.

3.6 ADJUSTING

A. Adjust isolators after system is at operating weight.

B. Adjust limit stops on restrained-spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a qualified testing agency.
2. Schedule test with Commissioner, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
3. Obtain Commissioner's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at no fewer than four of each type and size of installed anchors and fasteners selected by Commissioner.
5. Test to 90 percent of rated proof load of device.
6. Measure isolator restraint clearance.
7. Measure isolator deflection.
8. Verify snubber minimum clearances.

C. Remove and replace malfunctioning units and retest as specified above.

D. Units will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION 210548

SECTION 210553 - IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Warning signs and labels.
2. Pipe labels.
3. Valve tags.
4. Warning tags.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment-Label Schedule: Include a listing of all equipment to be labeled and the proposed content for each label.

D. Valve-numbering scheme.

E. Valve Schedules: Provide for fire-suppression piping system. Include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 WARNING SIGNS AND LABELS

A. Letter and Background Color: As indicated for specific application under Part 3.

B. Maximum Temperature: Able to withstand temperatures of up to 160 deg F.

C. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

D. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

E. Fasteners: Stainless steel rivets or self-tapping screws.

F. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

G. Arc-Flash Warning Signs: Provide arc-flash warning signs in locations and with content in accordance with requirements of OSHA and NFPA 70E, and other applicable codes and standards.

H. Label Content: Include caution and warning information, plus emergency notification instructions.

2.2 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color coded, with lettering indicating service and showing flow direction in accordance with ASME A13.1.

B. Letter and Background Color: As indicated for specific application under Part 3.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe-Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings. Also include the following:

1. Pipe size.
2. Flow-Direction Arrows: Include flow-direction arrows on main distribution piping. Arrows may be either integral with label or applied separately.
3. Lettering Size: Size letters in accordance with ASME A13.1 for piping.

2.3 VALVE TAGS

A. Letter and Background Color: As indicated for specific application under Part 3.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Include valve-tag schedule in operation and maintenance data.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.3 INSTALLATION GENERAL REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be installed.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

D. Locate identifying devices so that they are readily visible from the point of normal approach.

3.4 INSTALLATION OF EQUIPMENT LABELS, WARNING SIGNS, AND LABELS

A. Permanently fasten labels on each item of fire-suppression equipment.

B. Sign and Label Colors:

1. White letters on an ANSI Z535.1 safety-red background.

C. Locate equipment labels where accessible and visible.

D. Arc-Flash Warning Signs: Provide arc-flash warning signs on electrical disconnects and other equipment where arc-flash hazard exists, as indicated on Drawings, and in accordance with requirements of OSHA and NFPA 70E, and other applicable codes and standards.

3.5 INSTALLATION OF PIPE LABELS

A. Piping Color Coding: Painting of piping is specified in Section 099123 "Interior Painting."and Section 099611 "High-Performance Coatings."

B. Install pipe labels showing service and flow direction with permanent adhesive on pipes.

C. Stenciled Pipe-Label Option: Stenciled labels showing service and flow direction may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, with painted, color-coded bands or rectangles on each piping system.

1. Identification Paint: Use for contrasting background.
2. Stencil Paint: Use for pipe marking.

D. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Within 3 ft. of each valve and control device.
2. At access doors, manholes, and similar access points that permit a view of concealed piping.
3. Within 3 ft. of equipment items and other points of origination and termination.
4. Spaced at maximum intervals of 25 ft. along each run. Reduce intervals to 10 ft. in areas of congested piping and equipment.

E. Flow- Direction Arrows: Provide arrows to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

F. Fire-Suppression Pipe Label Color Schedule:

1. Fire-Suppression Pipe Labels: White letters on an ANSI Z535.1 safety-red background.

3.6 INSTALLATION OF VALVE TAGS

A. Install tags on valves and control devices in fire-suppression piping systems. List tagged valves in a valve-tag schedule in the operating and maintenance manual. Include the identification "FSV" on all fire-suppression system valve tags.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and with captions similar to those indicated in "Valve-Tag Size and Shape" Subparagraph below.

1. Valve-Tag Size and Shape:

a. Fire-Suppression Standpipe: 2 inches, round.
b. Wet-Pipe Sprinkler System: 2 inches, round.

2. Valve-Tag Color: White letters on an ANSI Z535.1 safety-red background.

3.7 INSTALLATION OF WARNING TAGS

A. Warning Tag Color: Black letters on an ANSI Z535.1 safety-yellow background.

B. Attach warning tags, with proper message, to equipment and other items where indicated on Drawings.

END OF SECTION 210553

SECTION 210800 - COMMISSIONING OF FIRE SUPPRESSION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes Cx process requirements for the following fire-suppression systems, assemblies, and equipment:

1. Fire and jockey pumps and associated controls.
2. Sprinkler system piping and controls.
3. Standpipe system piping and controls.

B. Related Requirements:

1. DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for general Cx process and testing requirements and CxA responsibilities.
2. For Construction Checklists, comply with requirements in various Division 21 Sections specifying fire-suppression systems, system components, equipment, and products.

1.3 DEFINITIONS

A. Cx: Commissioning, as defined in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems."

B. CxA: Commissioning Agent (Aka Commissioning Authority), as defined in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems."

1. The CxA directs and coordinates the commissioning activities and reports to the Commissioner. All members in the construction process work together to fulfill their contracted responsibilities and meet the objectives of the Owner’s Project Requirements as detailed in the Contract Documents.

C. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they mean "as-built" systems, assemblies, subsystems, equipment, and components.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 INFORMATIONAL SUBMITTALS

A. Construction Checklists:

1. Draft Cx plan, including draft Construction Checklists to be prepared by CxA under DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems." Div. 21 Subcontractor is to review Construction Checklist in accordance with requirements in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" and NFPA 3 and to resolve any issues with the CxA.

B. Test Equipment and Instruments: For all test equipment and instruments to be used in conducting Cx tests by Div. 21 Subcontractor, provide the following:

1. Equipment/instrument identification number.
2. Planned Cx application or use.
3. Manufacturer, make, model, and serial number.
4. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.
5. Equipment manufacturers' instrumentation and tools. For each instrument or tool, identify the following:

   a. Instrument or tool identification number.
   b. Equipment schedule designation of equipment for which the instrument or tool is required.
   c. Manufacturer, make, model, and serial number.
   d. Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.

1.6 CLOSEOUT SUBMITTALS

A. Provide operation and maintenance manuals complying with requirements of DDC General Conditions Section 017839 "Contract Record Documents" and Section 019113 “General Commissioning Requirements for MEP Systems.”

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Testing Equipment and Instrumentation Quality and Calibration:

1. Capable of testing and measuring performance within the specified acceptance criteria.
2. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
3. Be maintained in good repair and operating condition throughout duration of use on Project.
4. Be recalibrated/repaired if dropped or damaged in any way since last calibrated at no additional cost to City of New York.

C. Test Instrumentation and Tools:

1. Equipment Manufacturer's Instrumentation and Tools: For installed equipment included in the Cx process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, must comply with the following:

    a. Be calibrated by manufacturer with current calibration tags permanently affixed.
    b. Include a separate list of test instrumentation and tools in operation and maintenance manuals.

2. Fire-suppression system test instrumentation and tools become property of City of New York at the time of Substantial Completion.

1.8 COORDINATION

A. Refer to "Coordination" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for coordination requirements including the following:

1. Commissioning Kick-Off and other required meetings.
2. Construction Documents distribution to CxA.
3. Testing Coordination.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 Cx PROCESS

A. Perform Cx process in accordance with DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for BAS and fire suppression in accordance with the following:

1. New York City Energy Conservation Code.
2. ASHRAE 202.

3.3 CONTRACTOR’S RESPONSIBILITIES

A. In addition to the Contractor's responsibilities indicated in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" the Contractor is responsible for the following:

1. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance test requirements specified in Division 21 Sections specifying fire suppression systems and equipment.

2. Prepare preliminary schedule for fire suppression system orientations and inspections, operation and maintenance manual submissions, orientation sessions, system testing, flushing and cleaning, equipment start-up, and task completion for the City of New York.
3. Distribute preliminary schedule to commissioning team members at the beginning of the construction phase.

B. The Contractor must provide written notification to the Commissioner and CxA that the following work has been completed in accordance with the Contract Documents, and that the equipment, systems, and sub-systems are operating as designed:

1. Fire suppression equipment including fire pumps, jockey pumps, standpipe and sprinkler piping and accessories and other fire suppression systems furnished in Division 21 specification sections.
2. Integration to fire alarm system furnished in Division 28 specification sections.

3.4 CONSTRUCTION CHECKLISTS

A. Preliminary detailed Construction Checklists are to be prepared under Section 019113 "General Commissioning Requirements" for each BAS and fire suppression system, assembly, subsystem, equipment, and component required to be commissioned, as detailed in NFPA 3. Contractor performs the following:

1. Review fire-suppression system preliminary Construction Checklists and provide written comments on Construction Checklist items where appropriate.
2. Return preliminary Construction Checklist with review comments within 10 days of receipt.
3. When review comments have been resolved, the CxA will provide final Construction Checklists marked "Approved for Use, (date)."
4. Use only Construction Checklists marked "Approved for Use, (date)" when performing tests. Mark Construction Checklists in the appropriate place, as indicated Project events are completed, and provide pertinent details and other information.

B. Systems Required to Be Commissioned:

1. Fire and jockey pumps and associated controls.
2. Sprinkler system piping and controls.
3. Standpipe system piping and controls.

C. Additional Systems Required to Be Commissioned:

1. Facility fire-suppression water-distribution piping outside the building, including the following:

a. Fire-suppression water piping, fittings, and specialties outside the building.
b. Hydrants and fire-department connections.
c. Fire-alarm devices.
d. Meters and meter pits.
e. Outdoor water-storage tanks.
f. Sleeves and sleeve seals.
g. Meters and gauges.
h. General-duty and specialty valves.
i. Hangers and supports.
j. Heat tracing.

k. Vibration isolation.
l. Identification.
m. Insulation.

2. Fire-suppression standpipes, including the following:

a. Fire-suppression water piping, fittings, and specialties inside the building.
b. Fire-department connections.
c. Fire pumps, motors, accessories, and controls.
d. Pressure-maintenance pumps, motors, accessories, and controls.
e. Sleeves and sleeve seals.
f. Indoor water-storage tanks.
g. Meters and gauges.
h. General-duty and specialty valves.
i. Hangers and supports.
j. Heat tracing.
k. Vibration isolation.
l. Identification.
m. Insulation.

3. Fire-suppression sprinkler systems, including the following:

a. Wet-pipe sprinkler piping, fittings, sprinklers, and specialties.
b. Dry-pipe sprinkler piping, fittings, sprinklers, and specialties.
c. Pre-action, deluge sprinkler piping, fittings, sprinklers, and specialties.
d. Fire pumps, motors, accessories, and controls.
e. Pressure-maintenance pumps, motors, accessories, and controls.
f. Compressed-air piping, compressors, motors, accessories, and controls.
g. Sleeves and sleeve seals.
h. Meters and gauges.
i. General-duty and specialty valves.
j. Hangers and supports.
k. Heat tracing.
l. Vibration isolation.
m. Identification.
n. Insulation.

3.5 Cx TESTING PREPARATION

A. Refer to "Testing Procedures" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for preparation requirements prior to Functional Testing.

3.6 FIRE SUPPRESSION TESTING REQUIREMENTS

A. In addition to the requirements in the "General Testing Requirements" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems", provide the following:

1. Include entire fire suppression installation, from incoming utility water supply through standpipe and sprinkler water supply, and integration to fire alarm system specified in Div. 28 specification sections. Testing must include effectiveness of operational and control functions.

2. Prepare detailed testing plans, procedures, and checklists for fire suppression systems, subsystems, and equipment in conjunction with the CxA. Contractor to ensure the participation of the fire suppression Subcontractor and the fire alarm Subcontractor as needed for this work.
3. If tests cannot be completed because of a deficiency outside the scope of the fire suppression system, document the deficiency and report it to the Commissioner. After deficiencies are resolved, reschedule tests.

3.7 Cx TEST CONDITIONS

A. Refer to "General Testing Requirements" Article, and "Testing Procedures" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for satisfying Cx requirements related to testing.

3.8 FIRE SUPPRESSION SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in individual Division 21 sections. Provide submittals, test data, inspector record, and certifications to the CxA.

B. Pipe system cleaning, flushing, hydrostatic tests, standing head tests, and chemical treatment: Test requirements are specified in Division 21 piping sections. Fire suppression Subcontractor will prepare a flushing and cleaning plan and hydrostatic testing plans ahead of test execution. Fire suppression Subcontractor will generate reports documenting the test results. Provide flushing and cleaning plan and hydrostatic testing plans and reports to the CxA. Flushing and cleaning plan must include the following:

1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers must be keyed to Drawings for each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors must be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.
2. Description of equipment for flushing operations.
3. Minimum flushing water velocity.
4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.

C. Fire Pump Flow Testing: Provide technicians, instrumentation, tools, and equipment to test performance of the system as required by NFPA.

D. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls.

3.9 Cx TESTS COMMON TO FIRE-SUPPRESSION SYSTEMS

A. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions, to verify compliance with acceptance criteria.

B. Test systems, assemblies, subsystems, equipment, and components for operating modes, interlocks, control responses, responses to abnormal or emergency conditions, and response compared to acceptance criteria.

C. Coordinate schedule with, and perform Cx activities under the direction of, CxA.

D. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance test requirements specified in Division 21 sections specifying fire-suppression systems and equipment.

E. Provide technicians, instrumentation, tools, and equipment to perform and document the following:

1. Cx Construction Checklist verification tests.
2. Cx Construction Checklist verification test demonstrations.

3.10 Cx TESTS FOR DRY-PIPE SPRINKLER PIPING, FITTINGS, SPRINKLERS, AND SPECIALTIES

A. Air Compressor Run Time:

1. Prerequisites: Acceptance of results of Construction Checklists specified in Section 211316 "Dry-Piping Sprinkler Systems."
2. Systems and Equipment to Be Tested:

a. Air compressors in fire-suppression systems.
b. Associated compressed air piping, valves, and appurtenances.
c. Associated air pressure controllers.

3. Test Purpose: Evaluate air compressor run time and number of compressor starts.
4. Test Conditions:

a. Keep compressed air and associated sprinkler piping openings closed during test.
b. For systems with multiple compressors, lock out compressor motors on all but one compressor. Repeat test for each compressor in turn.
c. Record number of air compressor motor starts during a 14-day period.
d. Record air compressor motor run time during the same 14-day period.

5. Acceptance Criteria:

a. Number of compressor motor starts during test period must not exceed 20.
b. Compressor motor run time during test period must not exceed 60 minutes.

3.11 GUARANTY REVIEW / SEASONAL TESTING

A. Refer to "Guaranty Review / Seasonal Testing" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for guaranty review and seasonal testing requirements.

END OF SECTION 210800

SECTION 211000 - WATER-BASED FIRE-SUPPRESSION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Fire-suppression piping, fittings, and appurtenances.
2. Fire department connections.
3. Hose connections and hose stations.
4. System control valves.
5. Fire-suppression piping specialties.
6. Sprinklers.
7. Alarm devices.
8. Pressure gauges.

B. Related Requirements:

1. Section 331415 "Site Water Distribution Piping" for site fire-suppression water-service and backflow prevention devices.

1.3 DEFINITIONS

A. Standard-Pressure Fire-Suppression System Piping: Piping designed to operate at working pressure of 175 psig maximum.

B. High-Pressure Fire-Suppression System Piping: Piping designed to operate at working pressure higher than standard 175 psig, but not higher than 250 psig 300 psig.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

a. Include construction details, material descriptions, dimensions of individual components and profiles.
b. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings:

1. Prepare in accordance with NFPA 13 section "Working Plans."

a. Include plans, elevations, and sections of the system piping and details.
b. Include detailed riser diagram and schematic diagram showing system supply, supply connection, devices, valves, pipe and fittings, as well as the delineation of the standard-pressure and high-pressure portions of the fire-suppression system.
c. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

2. Prepare computer-generated hydraulic calculations in accordance with the following:

a. Minimum operating pressure at hydraulically most remote fire hose valve is to be 100 psig.
b. Name of hydraulic program used.
c. Water supply information, including fire hydrant flow test data report.

3. Submit documents and calculations signed and sealed by qualified professional licensed in the State of New York professional engineer responsible for their preparation.
4. Include diagrams for power, signal, and control wiring.

D. Coordination Drawings: Fire-suppression system plans and sections, or Building Information Model (BIM), drawn to scale, showing the items described in this Section and coordinated with all building trades.

1.6 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For fire-suppression equipment, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Qualification Data: For qualified Installer.

C. Design Data: Approved fire-suppression piping working plans, prepared in accordance with NFPA 13 and NFPA 14, including documented approval and including hydraulic calculations if applicable.

D. Welding certificates.

E. Field Test Reports:

1. Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13 NFPA 14. Include "Contractor's Material and Test Certificate for Aboveground Piping."
2. Fire-hydrant flow test report.

F. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-suppression systems and specialties to include in emergency, operation, and maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed as per requirements of the NYC Building Code and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.
2. System control valves.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing fire-suppression systems and providing the following professional services. Base calculations on results of fire-hydrant flow test.

C. Welding Qualifications: Qualify procedures and operators in accordance with ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Automatic wet-type, standpipe system.

B. Manual wet-type, Class I standpipe system.

C. Automatic combination wet-type standpipe sprinkler system.

D. Automatic wet-pipe sprinkler system.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Fire-suppression system piping to withstand the effects of earthquake motions determined in accordance with NFPA 13 and ASCE/SEI 7. See Section 210548 "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment."

B. Fire-Suppression System Components, Devices, and Accessories: Listed in UL's "Fire Protection Equipment Directory" and FM Approvals' "Approval Guide."

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Fire-suppression system equipment, specialties, accessories, installation, and testing to comply with NFPA 13.

E. Standard-Pressure Piping System Component: Listed for 175 psig minimum working pressure.

F. Obtain documented approval of fire-suppression system design from NYC Department of Buildings.

2.3 FIRE-SUPPRESSION PIPING, FITTINGS, AND APPURTENANCES

A. Steel Pipe, Fittings, and Appurtenances:

1. Schedule 40 Steel Pipe: steel pipe, ASTM A53/A53M, ASTM A135/A135M, or ASTM A795/A795M.

a. Standards:

1) UL 852.
2) FM 1630.

b. Factory-applied exterior coating.
c. Factory-applied bacterial-resistant internal coating to reduce microbiologically influenced corrosion.
d. Pipe ends may be factory or field formed to match joining method.

2. Malleable- or Ductile-Iron Unions: ASME B16.3.

2.4 FIRE DEPARTMENT CONNECTIONS

A. Fire Department Connection, Flush Type:

1. Standard: UL 405.
2. Description: Flush, for wall mounting.

3. Pressure Rating: 175 psig minimum.
4. Body Material: Corrosion-resistant metal.
5. Inlets: Brass with threads in accordance with NFPA 1963 and matching FDNY sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
6. Caps: Brass, lugged type, with gasket and chain.
7. Escutcheon Plate: Rectangular, brass, wall type.
8. Outlet: With pipe threads.

2.5 HOSE CONNECTIONS AND HOSE STATIONS

A. Hose Stations, Rack Type, NPS 1-1/2 by NPS 2-1/2:

1. Hose Valve:

a. Standards:

1) UL 668.
2) UL 1468.
3) NFPA 1963.

b. NPS 2-1/2, for connecting fire hose.
c. Pressure Rating: 300 psig minimum.
d. Pattern: Angle.
e. Material: Brass or bronze.
f. Size: NPS 2-1/2.
g. Inlet: Female pipe threads.
h. Outlet: Male hose threads and matching FDNY threads.
i. Reducer Adapter: NPS 2-1/2 by NPS 1-1/2.

2.6 SYSTEM CONTROL VALVES

A. Listed in UL's "Fire Protection Equipment Directory" or FM Approvals' "Approval Guide."

B. Body Material: Cast or ductile iron.

C. Size: Same as connected piping.

D. End Connections: Flanged or grooved.

2.7 FIRE-SUPPRESSION PIPING SPECIALTIES

A. Flow Detection and Test Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AGF Manufacturing, Inc.
b. Reliable Automatic Sprinkler Co., Inc. (The).
c. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.

d. Victaulic Company.
e. Or approved equal.

2. Standard: UL's "Fire Protection Equipment Directory" or FM Approvals' "Approval Guide."
3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded or grooved.

B. Automatic (Ball-Drip) Drain Valves:

1. Pressure Rating: 175 psig minimum.
2. Type: Automatic draining, ball check.
3. Size: NPS 3/4.
4. End Connections: Threaded.

2.8 SPRINKLERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Reliable Automatic Sprinkler Co., Inc. (The).
2. Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America.
3. Victaulic Company.
4. Viking Group Inc.
5. Or approved equal.

B. Standards:

1. UL 199.
2. UL 1767.
3. UL 1626.
4. FM 2000.
5. FM 2008.
6. FM 2030.

C. Listed in UL's "Fire Protection Equipment Directory" or FM Approvals' "Approval Guide."

D. Pressure Rating for Sprinklers:

1. Standard Automatic Sprinklers: 175 psig minimum.

2.9 ALARM DEVICES

A. Match alarm-device material and connection types to piping and equipment materials and connection types.

2.10 PRESSURE GAUGES

A. Standard: UL 393.

B. Dial Size: 3-1/2- to 4-1/2-inch diameter.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Perform fire-hydrant flow test. Use results for system design calculations required in "Quality Assurance" Article.

1. Flow test is to be performed to meet the criteria established by NFPA 13 and NFPA 14.
2. Flow test is to be conducted in accordance with NFPA 291.
3. Test is to be performed during a period of ordinary demand for the water system.

a. To obtain satisfactory test results of expected flow or rated capacities, sufficient discharge should be achieved to cause drop of at least 10 percent.

4. Pitot readings are to be taken at the 2-1/2-inch orifice connection.
5. The pitot reading is to range from 10 to 35 psig.
6. Open additional hydrant outlets as needed to control pitot readings.
7. The pitot pressure and corresponding residual pressure readings are to be taken consecutively as pressure fluctuates between a high number and low number.

B. Flow Test Data Written Report:

1. Flow data report is to be written in accordance with NFPA 291.
2. Flow data report is to include a copy of all flow data recorded during the test, including a site plan showing the tested fire hydrants with respect to the fire water service to the building. Site plan is to indicate which hydrant was flowed and which hydrant was used for pressure reading. Provide date of test, name of testing agency, and name of individual performing test.

C. Water Supply Curve: Provide water supply curve based on the lowest supply for a given set of test data. For a given residual pressure reading, the supply is to be graphed utilizing the corresponding pitot pressure/flow reading and static pressure reading.

D. Documentation is to include calibration certifications for gauges used in the flow tests. The certifications are to be from within the previous six (6) months from a reputable agency recognized for certifying pressure gauges.

E. Report flow test results promptly and in writing. A copy of the flow test data report is to be submitted with the hydraulic calculations.

3.3 INSTALLATION OF FIRE-SUPPRESSION WATER-SERVICE PIPING

A. Comply with requirements for fire-suppression water-service piping in Section 331415 "Site Water Distribution Piping."

3.4 INSTALLATION OF DOMESTIC WATER-SUPPLY CONNECTIONS

A. Connect fire-suppression water piping to building's interior domestic water-distribution piping. Comply with requirements for interior piping in Section 221116 "Domestic Water Piping."

B. Install shutoff valve, backflow preventer, pressure gauge, drain, and other accessories indicated at connection to water-distribution piping. Comply with requirements for backflow preventers in Section 331415 "Site Water Distribution Piping."

3.5 INSTALLATION OF FIRE-SUPPRESSION PIPING

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.

1. Deviations from approved working plans for piping require written approval from the NYC Department of Buildings. File written approval with Commissioner before deviating from approved working plans.
2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

B. Piping Standard: Comply with NFPA 13 and NFPA 14 requirements for installation of fire-suppression piping.

C. Install seismic restraints on piping. Comply with NFPA standards requirements for seismic-restraint device materials and installation.

D. Install listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions adjacent to each valve in pipes NPS 2 and smaller.

F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

G. Install inspector's test connections in sprinkler system piping, complete with shutoff valve, and sized and located in accordance with NFPA 13.

H. Install fire-suppression system piping with drains for complete system drainage. Extend drain piping to exterior of building where possible.

I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

J. Install automatic (ball drip) drain valve at each check valve for fire department connection, to drain piping between fire department connection and check valve. Install drain piping to and spill over floor drain or to exterior of building.

K. Install alarm devices in piping systems.

L. Install hangers and supports for fire-suppression piping in accordance with NFPA standards. Comply with requirements for hanger materials in NFPA standards. In seismic-rated areas, refer to Section 210548 "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment."

M. Install pressure gauges on riser or feed main, at each sprinkler test connection, and at top of each standpipe/sprinkler supply. Include pressure gauges with connection not less than NPS 1/4 and with soft-metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal, and install where they are not subject to freezing.

N. Fill wet-type fire-suppression system piping with water.

O. Drain dry-type fire-suppression system piping.

1. Install electric heating cables and pipe insulation on fire-suppression piping in areas subject to freezing. Comply with requirements for heating cables in Section 210533 "Heat Tracing for Fire-Suppression Piping" and for piping insulation in Section 210700 "Fire-Suppression Systems Insulation."

P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210500 "Common Work Results for Fire-Suppression Piping."

Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210500 "Common Work Results for Fire-Suppression Piping."

R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210500 "Common Work Results for Fire-Suppression Piping."

3.6 INSTALLATION OF PIPING JOINTS

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts in accordance with ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.

I. Steel-Piping, Pressure-Sealed Joints: Join steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

J. Welded Joints: Construct joints in accordance with AWS D10.12M/D10.12, using qualified processes and welding operators in accordance with "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

K. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe in accordance with AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings in accordance with AWWA C606 for steel-pipe joints.

L. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe in accordance with AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings in accordance with AWWA C606 for steel-pipe grooved joints.

M. Brazed Joints: Join copper tube and fittings in accordance with Copper Development Association's "Copper Tube Handbook," "Brazed Joints" chapter.

N. Copper-Tubing Grooved Joints: Roll rounded-edge groove in end of tube in accordance with AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings in accordance with AWWA C606 for steel-pipe grooved joints.

O. Copper-Tubing, Pressure-Sealed Joints: Join copper tube and copper pressure-seal fittings with tools recommended by fitting manufacturer.

P. Extruded-Tee Connections: Form tee in copper tube in accordance with ASTM F2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

Q. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

R. Plastic-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings in accordance with the following:

1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
2. CPVC Piping: Join in accordance with ASTM D2846/D2846M Appendix.

3.7 INSTALLATION OF FIRE DEPARTMENT CONNECTIONS

A. Install wall-type fire department connections.

B. Install yard-type fire department connections in concrete slab support. Comply with requirements for concrete in Section 033000 "Cast-in-Place Concrete."

C. Install three protective pipe bollards around each fire department connection. Comply with requirements for bollards in Section 055000 "Metal Fabrications."

D. Install automatic (ball-drip) drain valve at each check valve for fire department connection.

3.8 INSTALLATION OF HOSE CONNECTIONS AND HOSE STATIONS

A. Examine roughing-in for hose connections and hose stations to verify actual locations of piping connections before installation.

B. Examine walls and partitions for suitable thickness, fire- and smoke-rated construction, framing for hose-station cabinets, and other conditions where hose connections and hose stations are to be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Install hose connections adjacent to standpipes.

E. Install freestanding hose connections and hose stations for access and minimum passage restriction.

F. Install NPS 1-1/2 hose-connection and hose-station valves with flow-restricting device unless otherwise indicated.

G. Install NPS 2-1/2 hose connections with quick-disconnect NPS 2-1/2 by NPS 1-1/2 reducer adapter and flow-restricting device unless otherwise indicated.

H. Install wall-mounted-type hose connections and wall-mounted, rack hose stations in cabinets. Include pipe escutcheons, with finish matching valves, inside cabinet where water-supply piping penetrates cabinet. Install valves at angle required for connection of fire hose. Comply with requirements for cabinets in Section 104413 "Fire Protection Cabinets."

I. Install freestanding hose stations with support or bracket attached to standpipe.

J. Install hose-reel hose stations on wall with bracket.

3.9 INSTALLATION OF COVER SYSTEM FOR SPRINKLER PIPING

A. Install cover system, brackets, and cover components for sprinkler piping in accordance with manufacturer's installation manual and in accordance with NFPA 13 or NFPA 13R for supports.

3.10 INSTALLATION OF VALVES AND SPECIALTIES

A. Install listed fire-suppression system control valves, trim and drain valves, specialty valves and trim, controls, and specialties in accordance with manufacturer's installation instructions, NFPA standards, and AHJ.

B. Install listed fire-suppression system shutoff valves in supervised open position, located to control sources of water supply except from fire department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. System Control Valves:

1. Install alarm valves with bypass check valve and retarding chamber drain-line connection.

D. Air Vent:

1. Provide at least one air vent at high point in each wet-pipe fire-suppression system in accordance with NFPA standards. Connect vent into top of fire-suppression piping.
2. Provide dielectric union for dissimilar metals, ball valve, and strainer upstream of automatic air vent.
3. Pipe from outlet of air vent to drain.

3.11 INSTALLATION OF SPRINKLERS

A. Install sprinklers in suspended ceilings symmetrically in center of narrow dimension of acoustical ceiling panels within tolerance of 1/2 inch. Coordinate entire pattern of sprinkler locations with approved reflected ceiling plan.

B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.

C. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.

3.12 INSTALLATION OF NITROGEN GENERATOR WITH PURGE/VENT SYSTEM

A. Install in accordance with manufacturer's written installation instructions.

B. Locate purge vent/valve in accordance with manufacturer's written installation instructions.

C. Route alarm signals in code-approved electrical conduit from nitrogen generator system control panel to the supervisory circuit of BAS.

3.13 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping in accordance with requirements for identification specified in Section 210553 "Identification for Fire-Suppression Piping and Equipment."

B. Identify system components, wiring, cabling, and terminals.

3.14 CLEANING

A. Clean dirt and debris from fire-suppression system piping, system control valves, sprinklers, and associated components.

B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.15 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate system control valves and pressure-maintenance pumps.

3.16 PIPING SCHEDULE

A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends, cast-iron threaded fittings, and threaded joints.

B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.

C. Copper-tube, extruded-tee connections may be used for tee branches in copper tubing instead of specified copper fittings. Branch-connection joints must be brazed.

D. Standard-Pressure, Wet-Pipe Sprinkler System, NPS 2 and Smaller, to Be One of the Following:

1. Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

E. Standard-Pressure, Wet-Pipe Sprinkler System, NPS 2-1/2 to NPS 4, to Be One of the Following:

1. Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

F. Standard-Pressure, Wet-Pipe Sprinkler System, NPS 5 and Larger, to Be One of the Following:

1. Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

3.17 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

1. Rooms without Ceilings: Upright sprinklers.
2. Rooms with Suspended Ceilings: Flat concealed sprinklers and Vertical sidewall sprinklers.
3. Wall Mounting: Horizontal sidewall sprinklers and Flat concealed sidewall sprinklers.

B. Provide sprinkler types in sub paragraphs below with finishes indicated.

1. Upright, Pendent, and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces and locations not generally exposed to view; and wax coated where exposed to acids, chemicals, or other corrosive fumes.
2. Recessed Sprinklers: Bright chrome, with factory-painted white escutcheon.
3. Flat Concealed Sprinklers: Rough brass, with factory-painted white cover plate.

END OF SECTION 211000

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Motors.
2. Sleeves without waterstop.
3. Sleeves with waterstop.
4. Stack-sleeve fittings.
5. Sleeve-seal systems.
6. Escutcheons.

B. Related Requirements:

1. Section 221119 "Domestic Water Piping Specialties" for water meters.
2. Section 331415 "Site Water Distribution Piping" for domestic water meters and combined domestic and fire-protection water-service meters outside the building.

1.3 DEFINITIONS

A. Existing Piping to Remain: Existing piping that is not to be removed and that is not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For each type of product, excluding motors which are included in Part 1 of the plumbing equipment Sections.

   a. Include construction details, material descriptions, and dimensions of individual components, and finishes.
   b. Include operating characteristics and furnished accessories.

B. Submittals: For each anchor and alignment guide, including analysis data, signed and sealed by the qualified New York State licensed professional engineer responsible for their preparation.

1. Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and swing connections.
2. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions and methods of assembly and attachment to building structure.
3. Alignment Guide Details: Detail field assembly and attachment to building structure.
4. Schedule: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and location for each expansion joint.

C. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of expansion joint, and gauge to include in operation and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

C. Pipe and Pressure-Vessel Welding Qualifications: Qualify procedures and operators in accordance with 2021 ASME Boiler and Pressure Vessel Code, Section IX.

1.9 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Domestic water expansion fittings and loops for plumbing piping intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act, and with NSF 61 and NSF 372, or be certified in compliance with NSF 61 and NSF 372 by an ANSI-accredited third-party certification body, in that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

2.2 MOTORS

A. Motor Requirements, General:

1. Content includes motors for use on alternating-current power systems of up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.
2. Comply with requirements in this Section except when stricter requirements are specified in equipment schedules or Sections.
3. Comply with NEMA MG 1 unless otherwise indicated.
4. Comply with IEEE 841 for severe-duty motors.

B. Motor Characteristics:

1. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 ft. above sea level.
2. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

C. Polyphase Motors:

1. Description: NEMA MG 1, Design B, medium induction motor.
2. Efficiency: Premium Efficient, as defined in NEMA MG 1.
3. Service Factor: 1.15.
4. Multispeed Motors: Variable torque.

    a. For motors with 2:1 speed ratio, consequent pole, single winding.

5. Multispeed Motors, Two Winding: Separate winding for each speed.
6. Rotor: Random-wound, squirrel cage.
7. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
8. Temperature Rise: Match insulation rating.
9. Insulation: Class F.
10. Code Letter Designation:

    a. Motors Smaller Than 15 HP: Manufacturer's standard starting characteristic.

D. Single-Phase Motors:

1. Motors larger than 1/20 hp must be one of the following, to suit starting torque and requirements of specific motor application:

    a. Permanent-split capacitor.
    b. Split phase.
    c. Capacitor start, inductor run.
    d. Capacitor start, capacitor run.

2. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
3. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
4. Motors 1/20 HP and Smaller: Shaded-pole type.
5. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device will automatically reset when motor temperature returns to normal range.

E. Electronically Commutated Motors:

1. Three-phase power motor module with permanent magnet rotor.
2. Circuit board or digital speed controller/LED display.

2.3 EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

A. Performance Requirements:

1. Compatibility: Provide products suitable for piping service fluids, materials, working pressures, and temperatures.
2. Capability: Provide products and installations that will accommodate maximum axial movement as scheduled or indicated on Drawings.

2.4 SLEEVES AND SLEEVE SEALS

A. Sleeves without Waterstop:

1. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron, with plain ends.

B. Sleeves with Waterstop:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Advance Products & Systems, LLC.
    b. CALPICO, Inc.
    c. Metraflex Company (The).
    d. Or approved equal.

C. Stack-Sleeve Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Jay R. Smith Mfg Co; a division of Morris Group International.
b. Wade; a subsidiary of McWane Inc.
c. Zurn Industries, LLC.
d. Or approved equal.

2. Description: Manufactured, Dura-coated or Duco-coated cast-iron sleeve with integral clamping flange for use in waterproof floors and roofs. Include clamping ring, bolts, and nuts for membrane flashing.

D. Sleeve-Seal Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Advance Products & Systems, LLC.
b. GPT; a division of EnPRO Industries.
c. Metraflex Company (The).
d. Or approved equal.

2.5 ESCUTCHEONS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. BrassCraft Manufacturing Co.; a Masco company.
2. Dearborn Brass.
3. Jones Stephens Corp.
4. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF EXPANSION JOINTS, GENERAL

A. Install expansion joints of sizes matching sizes of piping in which they are installed.

3.3 INSTALLATION OF PIPE LOOP AND SWING CONNECTIONS

A. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

B. Connect risers and branch connections to mains with at least five pipe fittings, including tee in main.

C. Connect risers and branch connections to terminal units with at least four pipe fittings, including tee in riser.

D. Connect mains and branch connections to terminal units with at least four pipe fittings, including tee in main.

3.4 INSTALLATION OF SLEEVES - GENERAL

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 2-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using silicone sealant, seal the space outside of sleeves in floors/slabs/walls without sleeve-seal system. Select to maintain fire resistance of floor/slab/wall.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants that joint sealant manufacturer's literature indicates is appropriate for size, depth, and location of joint.

E. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

3.5 INSTALLATION OF SLEEVES WITH WATERSTOP

A. Install sleeve with waterstop as new walls and slabs are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange centered across width of concrete slab or wall.

C. Secure nailing flanges to wooden concrete forms.

D. Using silicone sealant, seal space around outside of sleeves. Select to maintain fire resistance of floor/slab/wall.

3.6 INSTALLATION OF STACK-SLEEVE FITTINGS

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."
3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using silicone sealant, seal space between top hub of stack-sleeve fitting and pipe.

B. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.7 INSTALLATION OF SLEEVE-SEAL SYSTEMS

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building, and passing through exterior walls.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.8 INSTALLATION OF ESCUTCHEONS

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

3.9 INSTALLATION OF METERS AND GAUGES

A. Install thermometer with thermowell at each required thermometer location.

B. Install thermowells in vertical position in piping tees.

C. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

D. Install thermowells with extension on insulated piping.

E. Fill thermowells with heat-transfer medium.

F. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

G. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks.

H. Install direct-mounted pressure gauges in piping tees with pressure gauge located on pipe at most readable position.

I. Install remote-mounted pressure gauges on panel.

J. Install valve and snubber in piping for each pressure gauge for fluids.

K. Install test plugs in piping tees.

L. Install thermometers in the following locations:

1. Inlet and outlet of each water heater.
2. Inlets and outlets of each domestic water heat exchanger.
3. Inlet and outlet of each domestic hot-water storage tank.
4. Inlet and outlet of each remote domestic water chiller.
5. Outlet side of hot-water-balancing valve.
6. Each main hot-water-recirculating line return pipe.

M. Install pressure gauges in the following locations:

1. Building water service entrance into building.
2. Inlet and outlet of each pressure-reducing valve.
3. Suction and discharge of each domestic water pump.

3.10 CONNECTIONS

A. Install meters and gauges adjacent to machines and equipment to allow space for service and maintenance of meters, gauges, machines, and equipment.

3.11 ADJUSTING

A. After installation, calibrate meters according to manufacturer's written instructions.

B. Adjust faces of meters and gauges to proper angle for best visibility.

END OF SECTION 220500

SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Ball valves.
2. Butterfly valves.
3. Check valves.
4. Gate valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene-diene terpolymer.

C. FKM: Fluoroelastomer.

D. NBR: Nitrile butadiene rubber (also known as Buna-N).

E. NRS: Nonrising stem.

F. OS&Y: Outside screw and yoke.

G. PTFE: Polytetrafluoroethylene.

H. RPTFE: Reinforced polytetrafluoroethylene.

I. RS: Rising stem.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

    a. Include material descriptions and dimensions of individual components.
    b. Include operating characteristics and furnished accessories.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooved ends, press ends, solder ends, and weld ends.
3. Set ball valves open to minimize exposure of functional surfaces.
4. Set butterfly valves closed or slightly open.
5. Block check valves in either closed or open position.
6. Set gate valves closed to prevent rattling.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems or other components as lifting or rigging points unless specifically indicated for this purpose in manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of valve from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Standards:

1. Domestic-water piping valves intended to convey or dispense water for human consumption must comply with the U.S. Safe Drinking Water Act (SDWA), and NSF 61/NSF 372; or to be certified in compliance with NSF 61/NSF 372 by an American National Standards Institute (ANSI)-accredited third-party certification body, that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded-end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.5 for flanges on steel valves.
4. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
5. ASME B16.18 for cast-copper solder-joint connections.
6. ASME B16.22 for wrought-copper solder-joint connections.
7. ASME B16.34 for flanged- and threaded-end connections.
8. ASME B16.51 for press joint connections.
9. ASME B31.9 for building services piping valves.

C. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

D. Provide bronze valves made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are unacceptable.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Bypass and Drain Connections: MSS SP-45.

H. Valve Actuator Type:

1. Gear Actuator: For quarter-turn ball valves NPS 4 and larger.
2. Hand Lever: For quarter-turn ball valves smaller than NPS 4.

I. Valves in Insulated Piping:

1. Provide 2-inch extended neck stems.
2. Provide extended operating handles with nonthermal-conductive covering material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Provide memory stops that are fully adjustable after insulation is applied.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Examine press fittings to verify they have been properly pressed.

F. Do not attempt to repair defective valves; replace with new valves. Remove defective valves from site.

3.3 INSTALLATION OF VALVES

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Provide support of piping adjacent to valves such that no force is imposed upon valves.

C. Locate valves for easy access and where not blocked by equipment, other piping, or building components.

D. For valves in horizontal piping, install valves with stem at or above center of pipe.

E. Install valves in position that does not project into aisles or block access to other equipment.

F. Install valves in position to allow full stem and actuator or manual operator movement.

G. Verify that joints of each valve have been properly installed and sealed to assure there is no leakage or damage.

H. Install check valves for proper direction of flow and as follows:

1. Check Valves: Center-guided type and plate type, in horizontal or vertical position, between flanges.
2. Check Valves, Swing Type: In horizontal position with hinge pin level.
3. Check Valves, Lift Type: With stem upright and plumb.

I. Valve Tags: Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

J. Adhere to manufacturer's written installation instructions. When soldering or brazing valves, do not heat valves above maximum permitted temperature. Do not use solder with melting point temperature above valve manufacturer's written recommended maximum.

3.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.5 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

B. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option or press-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
5. For Steel Piping, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends except where threaded valve-end option is indicated in valve schedules below.
6. For Steel Piping, NPS 5 and Larger: Flanged ends.
7. For Stainless Steel Piping, NPS 2 and Smaller: Threaded ends.
8. For Stainless Steel Piping, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends.
9. For Grooved-End Copper Tubing: Valve ends may be grooved.
10. For Grooved-End Steel Piping: Valve ends may be grooved.
11. Wafer-Type Valves: Flanged connections.

END OF SECTION 220523

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Pipe-positioning systems.
4. Equipment supports.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Environmental Product Declaration (EPD): For each product.
3. Trapeze pipe hangers.
4. Metal framing systems.
5. Fiberglass strut systems.
6. Pipe stands.
7. Equipment supports.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

C. Pipe Welding Qualifications: Qualify procedures and operators according to 2015 ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer licensed in the State of New York, as defined in DDC General Conditions, to design trapeze pipe hangers and equipment supports.

B. Structural Performance: Hangers and supports for plumbing piping and equipment must withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly, made from structural-carbon-steel shapes, with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 APPLICATION

A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.

3.3 INSTALLATION OF HANGER AND SUPPORT

A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size, or install intermediate supports for smaller-diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Fiberglass Pipe-Hanger Installation: Comply with applicable portions of MSS SP-58. Install hangers and attachments as required to properly support piping from building structure.

D. Framing System Installation: Metal; arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

E. Thermal Hanger-Shield Installation: Install in pipe hanger or shield for insulated piping.

F. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete, after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete, after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

G. Pipe Stand Installation:

1. Pipe Stand Types, except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.

H. Pipe-Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

I. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

J. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

K. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

L. Install lateral bracing with pipe hangers and supports to prevent swaying.

M. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms, and install reinforcing bars through openings at top of inserts.

N. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

O. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

P. Insulated Piping:

1. Attach clamps and spacers to piping.

   a. Piping Operating Above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating Below Ambient Air Temperature: Use thermal hanger-shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. MSS SP-58, Type 39: Install protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. MSS SP-58, Type 40: Install protective shields on cold piping with vapor barrier. Shields must span an arc of 180 degrees.

   a. Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
   e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal Hanger Shields: Install with insulation of same thickness as piping insulation.

3.4 INSTALLATION OF EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Provide lateral bracing, to prevent swaying, for equipment supports.

3.5 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections, so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.6 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.7 PAINTING

A. Touchup:

1. Clean field welds and abraded, shop-painted areas. Paint exposed areas immediately after erecting hangers and supports. Use same materials as those used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

   a. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

2. Cleaning and touchup painting of field welds, bolted connections, and abraded, shop-painted areas on miscellaneous metal are specified in Section 099123 "Interior Painting" and Section 099611 "High-Performance Coatings".

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A 780/A 780M.

END OF SECTION 220529

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Warning tape.
4. Pipe labels.
5. Stencils.
6. Valve tags.
7. Warning tags.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment-Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve-numbering scheme.

E. Valve Schedules: For each piping system. Include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Brimar Industries, Inc.
   b. Kolbi Pipe Marker Co.
   c. LEM Products Inc.
   d. Or approved equal.

2. Material and Thickness: aluminum, 0.032-inch minimum thickness, with predrilled or stamped holes for attachment hardware.
3. Letter and Background Color: As indicated for specific application under Part 3.
4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
5. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
6. Fasteners: Stainless steel rivets or self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

2.2 WARNING SIGNS AND LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brimar Industries, Inc.
2. LEM Products Inc.
3. Marking Services Inc.
4. Stranco, Inc.
5. Or approved equal.

B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, with predrilled holes for attachment hardware.

C. Letter and Background Color: As indicated for specific application under Part 3.

D. Maximum Temperature: Able to withstand temperatures of up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Arc-Flash Warning Signs: Provide arc-flash warning signs in locations and with content in accordance with requirements of OSHA and NFPA 70E, and other applicable codes and standards.

J. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 WARNING TAPE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brimar Industries, Inc.
2. Craftmark Pipe Markers.
3. National Marker Company.
4. Or approved equal.

B. Material: Vinyl.

C. Minimum Thickness: 0.005 inch.

D. Letter, Pattern, and Background Color: As indicated for specific application under Part 3.

E. Waterproof Adhesive Backing: Suitable for indoor or outdoor use.

F. Maximum Temperature: 160 deg F.

G. Minimum Width: 4 inches.

2.4 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color coded, with lettering indicating service and showing flow direction in accordance with ASME A13.1.

B. Letter and Background Color: As indicated for specific application under Part 3.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

2.5 VALVE TAGS

A. Letter and Background Color: As indicated for specific application under Part 3.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Include valve-tag schedule in operation and maintenance data.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.3 INSTALLATION, GENERAL REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

D. Locate identifying devices so that they are readily visible from the point of normal approach.

3.4 INSTALLATION OF EQUIPMENT LABELS, WARNING SIGNS, AND LABELS

A. Permanently fasten labels on each item of plumbing equipment.

B. Sign and Label Colors.

1. White letters on an ANSI Z535.1 safety-green background.

C. Locate equipment labels where accessible and visible.

D. Arc-Flash Warning Signs: Provide arc-flash warning signs on electrical disconnects and other equipment where are-flash hazard exists, as indicated on Drawings, and in accordance with requirements of OSHA and NFPA 70E**,** and other applicable codes and standards.

3.5 INSTALLATION OF WARNING TAPE

A. Warning Tape Color and Pattern: Yellow background with black diagonal stripes.

B. Install warning tape on pipes and ducts, with cross-designated walkways providing less than 6 ft. of clearance.

C. Locate tape so as to be readily visible from the point of normal approach.

3.6 INSTALLATION OF PIPE LABELS

A. Piping Color Coding: Painting of piping is specified in Section 099123 "Interior Painting" and Section 099611 "High-Performance Coatings."

B. Install pipe labels showing service and flow direction with permanent adhesive on pipes.

C. Stenciled Pipe Label Option: Stenciled labels showing service and flow direction may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, with painted, color-coded bands or rectangles on each piping system.

D. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Within 3 ft. of each valve and control device.
2. At access doors, manholes, and similar access points that permit view of concealed piping.
3. Within 3 ft. of equipment items and other points of origination and termination.
4. Spaced at maximum intervals of 25 ft. along each run. Reduce intervals to 10 ft. in areas of congested piping and equipment.

E. Do not apply plastic pipe labels or plastic tapes directly to bare pipes conveying fluids at temperatures of 125 deg F or higher. Where these pipes are to remain uninsulated, use a short section of insulation or use stenciled labels.

F. Flow-Direction Flow Arrows: Use arrows, in compliance with ASME A13.1, to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

G. Pipe-Label Color Schedule:
1. Domestic Cold-Water Piping: White letters on an ANSI Z535.1 safety-green background.
2. Domestic Hot-Water Piping: White letters on an ANSI Z535.1 safety-green background.
3. Domestic Hot-Water Return Piping White letters on an ANSI Z535.1 safety-green background.
4. Sanitary Waste and Storm Drainage Piping: White letters on a black background.
5. Nonpotable Cold Water: Black letters on an ANSI Z535.1 safety-yellow background.

3.7 INSTALLATION OF VALVE TAGS

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule in the operating and maintenance manual.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in "Valve-Tag Size and Shape" Subparagraph below:

1. Valve-Tag Size and Shape:

    a. Domestic Cold Water: 2 inches, round.
    b. Domestic Hot Water: 2 inches, round.
    c. Domestic Hot-Water Return: 2 inches, round.

2. Nonpotable Cold Water: 2 inches, roundValve-Tag Colors:

    a. For each piping system, use the same lettering and background coloring system on valve tags as used in the piping system labels and background.

3.8 INSTALLATION OF WARNING TAGS

A. Warning Tag Color: Black letters on an ANSI Z535.1 safety-yellow background.

B. Attach warning tags, with proper message, to equipment and other items where indicated on Drawings .

END OF SECTION 220553

SECTION 220593 - TESTING, ADJUSTING, AND BALANCING FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. TAB of domestic water system.
2. Testing, adjusting, and balancing of existing plumbing systems and equipment.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

F. TDH: Total dynamic head.

1.4 PREINSTALLATION MEETINGS

A. TAB Conference: If requested by the Commissioner, conduct a TAB conference at project site after approval of the TAB strategies and procedures plan, to develop a mutual understanding of the details. Provide a minimum of 14 days' advance notice of scheduled meeting time and location.

1. Minimum Agenda Items:

a. The Contract Documents examination report.
b. The TAB plan.
c. Needs for coordination and cooperation of trades and subcontractors.
d. Proposed procedures for documentation and communication flow.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: Submit TAB Specialist qualifications within 30 days from start of the work.

B. Contract Documents Examination Report: Submit the Initial Construction-Phase Report as specified in "Progress Reporting" Article in Part 3, within 30 days from start of the work.

C. Strategies and Procedures Plan: Submit TAB strategies and step-by-step procedures, as specified in "Preparation" Article in Part 3, within 30 days from start of the work.

D. System Readiness Checklists: Submit system readiness checklists, as specified in "Preparation" Article in Part 3, within 30 days from start of the work.

E. Examination Report: Submit a summary report of the examination review required in "Examination" Article.

F. Certified TAB reports.

G. Sample report forms.

H. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. TAB Specialists Qualifications, Certified by AABC.

C. TAB Specialists Qualifications, Certified by NEBB.

D. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."

E. ASHRAE 111 Compliance: Requirements in ASHRAE 111 applicable to analogous domestic water system and plumbing equipment balancing.

F. ASHRAE 188 Compliance: Comply with balancing and report requirements, Section 8.3 "Balancing."

G. Code Compliance: TAB is required to comply with requirements of 2022 NYC Building Code.

1.8 FIELD CONDITIONS

A. Partial City of New York Occupancy: City of New York may occupy completed areas of building before Substantial Completion. Cooperate with Commissioner during TAB operations to minimize conflicts with City of New York's operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices, and balancing valves and fittings. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine approved submittals for plumbing systems and equipment.

D. Examine design data, including plumbing system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about plumbing system and equipment controls.

E. Examine equipment performance data, including pump curves.

1. Relate performance data to Project conditions and requirements, including pump system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate pump system-effect factors to reduce performance ratings of plumbing equipment when installed under conditions different from the conditions used to rate equipment performance. Compare results with the design data and installed conditions.

F. Examine system and equipment installations, and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

G. Examine test reports specified in individual system and equipment Sections.

H. Examine plumbing equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

I. Examine temporary and permanent strainers. Verify that temporary strainer screens used during system cleaning and flushing have been removed and permanent strainers are installed and clean.

J. Examine control valves for proper installation for their intended function of isolating, throttling, diverting, or mixing fluid flows.

K. Examine system pumps to ensure absence of entrained air in the suction piping.

L. Examine operating safety interlocks and controls on plumbing equipment.

M. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 PREPARATION

A. Prepare a TAB plan that includes the following:

1. Equipment and systems to be tested.
2. Strategies and step-by-step procedures for balancing the systems.
3. Instrumentation to be used.
4. Sample forms with specific identification for all equipment.

B. Perform system-readiness checks of plumbing systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Domestic Water System:

a. Verify leakage and pressure tests on water distribution systems have been satisfactorily completed in accordance with 2022 NYC Building code.
b. Water heaters are installed and functioning.
c. Piping is complete and all points of outlet are installed.
d. Water treatment is complete.
e. Systems are flushed, filled, and air purged.
f. Strainers are clean.
g. Control valves are functioning in accordance with the sequence of operation.
h. Shutoff and balance valves are 100 percent open.
i. Booster- and hot-water circulating pumps are operational and proper rotation is verified.
j. Pump gauge connections are installed directly at pump inlet and outlet flanges or in discharge and suction pipe prior to valves or strainers.
k. Variable-frequency controllers' startup is complete and safeties are verified.
l. Suitable access to balancing devices and equipment is provided.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system in accordance with the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 111, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.

B. Cut insulation, pipes, and equipment casings for installation of test probes to the minimum extent necessary for TAB procedures.

1. Where holes for probes are required in piping or equipment, install pressure and temperature test plugs to seal systems.
2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish in accordance with Section 220719 "Plumbing Piping Insulation."

C. Mark equipment and balancing devices, including valve position indicators and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.5 PROCEDURES FOR DOMESTIC WATER SYSTEMS

A. Prepare test reports for pumps and other equipment. Obtain approved submittals and manufacturer-recommended testing procedures. Crosscheck the summation of required equipment flow rates with system design flow rates.

B. Prepare schematic diagrams of systems' Record drawings piping layouts.

C. In addition to requirements in "Preparation" Article, prepare domestic water systems for testing and balancing as follows:

1. Check expansion tank for proper setting.
2. Check water heater for proper discharge temperature setting.
3. Check remotest point of outlet for adequate pressure.
4. Check flow-control valves for proper position.
5. Locate start-stop and disconnect switches, electrical interlocks, and motor controllers.
6. Verify that motor controllers are equipped with properly sized thermal protection.
7. Check that air has been purged from the system.

D. Measure and record upstream and downstream pressure of each piece of equipment.

E. Measure and record upstream and downstream pressure of pressure-reducing valves.

F. Check settings and operation of automatic temperature-control valves, self-contained control valves, and pressure-reducing valves. Record final settings.

G. Check settings and operation of each safety valve. Record settings.

3.6 PROCEDURES FOR DOMESTIC HOT-WATER CIRCULATING INLINE PUMP

A. Balance system with manual or automatic balancing valves by setting at design flow.

1. Measure flow in main and branch pipes.
2. Adjust main and branch balance valves for design flow.
3. Re-measure each main and branch after all have been adjusted.

B. Adjust pump to deliver total design flow.

1. Measure pump TDH as follows:

a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
c. Convert pressure to head and correct for differences in gauge heights.
d. Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow, and verify that the pump has the intended impeller size.

2. Monitor motor performance during procedures, and do not operate motor in an overloaded condition.
3. Mark final settings and verify that all memory stops have been set.
4. Verify final system conditions as follows:

a. Re-measure and confirm that total flow is within design.
b. Re-measure final pumps' operating data, TDH, volts, amps, speed, and static profile.
c. Mark final settings.

3.7 PROCEDURES FOR MOTORS

A. Motors 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Phase and hertz.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter size and thermal-protection-element rating.
8. Service factor and frame size.

B. Motors Driven by Variable-Frequency Controllers: Test manual bypass of controller to prove proper operation.

3.8 PROCEDURES FOR WATER HEATERS

A. Electric Water Heaters:

1. Measure and record entering- and leaving-water temperatures.
2. Measure and record water flow.
3. Measure and record pressure drop.
4. Measure and record relief valve(s) pressure setting.
5. Capacity: Calculate in Btu/h of heating output.
6. Efficiency: Calculate operating efficiency for comparison to submitted equipment.

B. Fan, motor, and motor controller operating data.

3.9 TOLERANCES

A. Set plumbing system's flow rates within the following tolerances:

1. Domestic Water Flow Rate: Plus or minus 5 percent. If design value is less than 10 gpm, within 10 percent.

3.10 PROGRESS REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for system-balancing devices. Recommend changes and additions to system-balancing devices, to facilitate proper performance measuring and balancing. Recommend changes and additions to plumbing systems and general construction to allow access for performance-measuring and -balancing devices.

B. Status Reports: Prepare biweekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.11 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer, retained by the Contractor.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.

9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents, including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Notes to explain why certain final data in the body of reports vary from indicated values.
14. Test conditions for pump performance forms, including the following:

    a. Variable-frequency controller settings for variable-flow hydronic systems.
    b. Settings for pressure controller(s).
    c. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of distribution systems. Present each system with single-line diagram and include the following:

1. Flow rates.
2. Pipe and valve sizes and locations.
3. Balancing stations.
4. Position of balancing devices.

E. Gas- and Oil-Fired Water Heaters Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

    a. System identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.
    f. Fuel type in input data.
    g. Output capacity in Btu/h.
    h. Ignition type.
    i. Burner-control types.
    j. Motor horsepower and speed.
    k. Motor volts, phase, and hertz.
    l. Motor full-load amperage and service factor.
    m. Sheave make, size in inches, and bore.
    n. Center-to-center dimensions of sheave and amount of adjustments in inches.

2. Test Data (Indicated and Actual Values):

    a. Total airflow rate in cfm.
    b. Entering-water temperature in deg F.
    c. Leaving-water temperature in deg F.
    d. Low-fire fuel input in Btu/h.

e. High-fire fuel input in Btu/h.
f. High-temperature-limit setting in deg F.
g. Operating set point in Btu/h.
h. Heating value of fuel in Btu/h.

F. Electric Water Heater Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Model number and unit size.
d. Manufacturer's serial number.
e. Output capacity in Btu/h.
f. Number of stages.
g. Connected volts, phase, and hertz.
h. Rated amperage.

2. Test Data (Indicated and Actual Values):

a. Heat output in Btu/h.
b. Entering-water temperature in deg F.
c. Leaving-water temperature in deg F.
d. High-temperature-limit setting in deg F.
e. Operating set point in deg F.
f. Voltage at each connection.
g. Amperage for each phase.

G. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves, and include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Service.
d. Make and size.
e. Model number and serial number.
f. Water flow rate in gpm.
g. Water-pressure differential in feet of head or psig.
h. Required net positive suction head in feet of head or psig.
i. Pump speed.
j. Impeller diameter in inches.
k. Motor make and frame size.
l. Motor horsepower and rpm.
m. Voltage at each connection.
n. Amperage for each phase.
o. Full-load amperage and service factor.
p. Seal type.

2. Test Data (Indicated and Actual Values):

   a. Static head in feet of head or psig.
   b. Pump shutoff pressure in feet of head or psig.
   c. Actual impeller size in inches.
   d. Full-open flow rate in gpm.
   e. Full-open pressure in feet of head or psig.
   f. Final discharge pressure in feet of head or psig.
   g. Final suction pressure in feet of head or psig.
   h. Final total pressure in feet of head or psig.
   i. Final water flow rate in gpm.
   j. Voltage at each connection.
   k. Amperage for each phase.

H. Instrument Calibration Reports:

1. Report Data:

   a. Instrument type and make.
   b. Serial number.
   c. Application.
   d. Dates of use.
   e. Dates of calibration.

3.12 VERIFICATION OF TAB REPORT

A. The TAB specialist must conduct the inspection in the presence of Commissioner.

B. Commissioner will randomly select measurements, documented in the final report, to be rechecked. Rechecking must be limited to the lesser of either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal business day.

C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements must be noted as "FAILED."

D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the TAB must be considered incomplete and must be rejected.

E. If recheck measurements find the number of failed measurements noncompliant with requirements indicated, proceed as follows:

1. TAB specialists must recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection. All changes must be tracked to show changes made to previous report.

F. Prepare test and inspection reports.

3.13 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

END OF SECTION 220593

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Domestic hot-water and re-circulating hot-water piping.
4. Domestic chilled-water piping for drinking fountains.
5. Sanitary waste piping exposed to freezing conditions.
6. Storm-water piping exposed to freezing conditions.
7. Roof drains and rainwater leaders.
8. Supplies and drains for accessible lavatories and sinks.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

C. Samples: For each type of insulation and jacket indicated, identify each sample, describing product and intended use. Sample sizes are as follows:

1. Preformed Pipe Insulation Materials: 12 inches long.
2. Jacket Materials for Pipe: 12 inches long.
3. Sheet Jacket Materials: 12 inches square.
4. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Mockups: Before installing insulation, build mockups for each type of insulation and finish listed below to demonstrate quality of insulation application and finishes. Build mockups in the location indicated or, if not indicated, as directed by Commissioner. Use materials indicated for the completed Work.

1. Piping Mockups:

   a. One 10-foot section of NPS 2 straight pipe.
   b. One each of a 90-degree threaded, welded, and flanged elbow.
   c. One each of a threaded, welded, and flanged tee fitting.
   d. One NPS 2 or smaller valve and one NPS 2-1/2 or larger valve.
   e. Four support hangers, including hanger shield and insert.
   f. One threaded strainer and one flanged strainer with removable portion of insulation.
   g. One threaded reducer and one welded reducer.
   h. One pressure temperature tap.
   i. One mechanical coupling.
   j. One union.

2. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
3. Notify Commissioner seven days in advance of dates and times when mockups will be constructed.
4. Obtain Commissioner's approval of mockups before starting insulation application.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed.

C. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation system materials are to be delivered to the Project site in unopened containers. The packaging is to include name of the manufacturer, fabricator, type, description, and size**,** as well as ASTM standard designation and maximum use temperature.

1.8 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.9 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84, by a testing agency. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.

1. All Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. All Insulation Installed Indoors; Outdoors-Installed Insulation in Contact with Airstream: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
3. All Insulation Installed Indoors and Outdoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range of between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature of between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the tradesman installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system, as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, compress, or otherwise damage insulation or jacket.

D. Install insulation with longitudinal seams at top and bottom (12 o'clock and 6 o'clock positions) of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with Contract Documents, unless otherwise approved by the Commissioner.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.
3. Install insert materials and insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth, but not to the extent of creating wrinkles or areas of compression in the insulation.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 4 inches o.c.

   a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.5 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
2. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
2. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.

3.6 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials, except where more specific requirements are specified in various pipe insulation material installation articles below.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, Mechanical Couplings, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, mechanical couplings, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.

2. Insulate pipe elbows using preformed fitting insulation or mitered or routed fittings made from same material and density as that of adjacent pipe insulation. Each piece is butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as that used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers, so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges, mechanical couplings, and unions, using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Stencil or label the outside insulation jacket of each union with the word "union" matching size and color of pipe labels.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket, except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing, using PVC tape.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation conforms to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as that of adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union at least 2 times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.7 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Do not field paint aluminum or stainless steel jackets.

END OF SECTION 220719

SECTION 220800 - COMMISSIONING OF PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes Cx process requirements for the following plumbing systems, assemblies, and equipment:

1. Domestic hot- and cold-water piping.
2. Sanitary waste and vent piping.
3. Storm drainage piping.
4. Plumbing pumps.
5. General-service compressed-air piping and equipment.
6. Plumbing equipment.

B. Related Requirements:

1. DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for general Cx process and testing requirements and CxA responsibilities.
2. For Construction Checklists, comply with requirements in various Division 22 Sections specifying plumbing systems, system components, equipment, and products.

1.3 DEFINITIONS

A. Cx: Commissioning, as defined in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems."

B. CxA: Commissioning Agent (Aka Commissioning Authority), as defined in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems."

1. The CxA directs and coordinates the commissioning activities and reports to the Commissioner. All members in the construction process work together to fulfill their contracted responsibilities and meet the objectives of the Owner’s Project Requirement’s as detailed in the Contract Documents.

C. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they mean "as-built" systems, assemblies, subsystems, equipment, and components.

D. TAB: Testing, adjusting, and balancing.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 INFORMATIONAL SUBMITTALS

A. Construction Checklists:

1. Draft Cx plan, including draft Construction Checklists to be prepared by CxA under DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems." Div. 22 Subcontractor is to review Construction Checklist in accordance with requirements in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" and ASHRAE 202 and to resolve any issues with the CxA.

B. Test Equipment and Instruments: For all test equipment and instruments to be used in conducting Cx tests by Plumbing Subcontractor, provide the following:

1. Equipment/instrument identification number.
2. Planned Cx application or use.
3. Manufacturer, make, model, and serial number.
4. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.
5. Equipment manufacturers' instrumentation and tools. For each instrument or tool, identify the following:

a. Instrument or tool identification number.
b. Equipment schedule designation of equipment for which the instrument or tool is required.
c. Manufacturer, make, model, and serial number.
d. Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.

1.6 CLOSEOUT SUBMITTALS

A. Provide operation and maintenance manuals complying with requirements of DDC General Conditions Section 017839 "Contract Record Documents" and Section 019113 “General Commissioning Requirements for MEP Systems.”

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Testing Equipment and Instrumentation Quality and Calibration:

1. Capable of testing and measuring performance within the specified acceptance criteria.
2. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
3. Be maintained in good repair and operating condition throughout duration of use on Project.

4. Be recalibrated/repaired if dropped or damaged in any way since last calibrated at no additional cost to City of New York.

C. Test Instrumentation and Tools:

1. Equipment Manufacturer's Instrumentation and Tools: For installed equipment included in the Cx process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, mustcomply with the following:

   a. Be calibrated by manufacturer with current calibration tags permanently affixed.
   b. Include a separate list of proprietary test instrumentation and tools in operation and maintenance manuals.

2. Plumbing system test instrumentation and tools become property of City of New York at the time of Substantial Completion.

1.8 COORDINATION

A. Refer to "Coordination" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for coordination requirements including the following:

1. Commissioning Kick-Off and other required meetings.
2. Construction Documents distribution to CxA.
3. Testing Coordination.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 Cx PROCESS

A. Perform Cx process in accordance with DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for BAS and plumbing and in accordance with the following:

1. New York City Energy Conservation Code.
2. ASHRAE 202.

3.3 CONTRACTOR’S RESPONSIBILITIES

A. In addition to the Contractor's responsibilities indicated in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" the Contractor is responsible for the following:

1. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance test requirements specified in Division 22 Sections specifying plumbing systems and equipment.
2. Attend construction phase controls coordination meetings and ensure that the Plumbing and Controls Subcontractors attend.
3. Attend testing, adjusting, and balancing review and coordination meetings and ensure that the Plumbing Subcontractor and TAB Specialist attend.
4. Prepare preliminary schedule for mechanical system orientations and inspections, operation and maintenance manual submissions, orientation sessions, pipe and duct system testing, flushing and cleaning, equipment start-up, testing and balancing and task completion for the City of New York.
5. Distribute preliminary schedule to commissioning team members at the beginning of the construction phase.

B. TAB Specialist, under the direction of the Contractor to undertake the following:

1. Attend initial commissioning coordination meeting scheduled by the CxA.
2. Submit the site-specific testing and balancing plan to the CxA and Commissioner for review and acceptance.
3. Attend the testing and balancing review meeting scheduled by the CxA. Discuss the procedures for testing, adjusting, and balancing the plumbing system.
4. At the completion of the testing and balancing work, and the submittal of the final testing and balancing report, notify the Plumbing Subcontractor and the Contractor.
5. Participate in verification of the testing and balancing report, which will consist of repeating measurements contained in the testing and balancing reports. Assist in diagnostic purposes.
6. Provide recommended setpoints as determined by testing, adjusting, and balancing, such as static pressure and differential pressure setpoints.

C. The Contractor to provide written notification to the Commissioner and CxA that the following work has been completed in accordance with the Contract Documents, and that the equipment, systems, and sub-systems are operating as designed.

1. Plumbing equipment including sanitary drain piping, gas piping, domestic water piping and equipment and other plumbing systems furnished in Division 23 specification sections.
2. Fire stopping in the fire rated construction, including fire and smoke damper installation furnished in Division 07 specification sections.
3. Fire detection and smoke detection devices furnished in Division 28 specification sections.

3.4 CONSTRUCTION CHECKLISTS

A. Preliminary detailed construction checklists are to be prepared under Section 019113 "General Commissioning Requirements" for MEP Systems for each BAS and plumbing system, assembly, subsystem, equipment, and component required to be commissioned, as detailed in ASHRAE 202. Contractor performs the following:

1. Review BAS and Plumbing preliminary Construction Checklists and provide written comments on Construction Checklist items where appropriate.
2. Return preliminary Construction Checklist with review comments within 10 days of receipt.
3. When review comments have been resolved, the CxA will provide final Construction Checklists marked "Approved for Use, (date)."

4. Use only Construction Checklists marked "Approved for Use, (date)." Mark Construction Checklists in the appropriate place, as indicated Project events are completed, and provide pertinent details and other information.

B. Systems Required to Be Commissioned:

1. Domestic hot-water systems and controls.
2. Water-pumping and -mixing systems over 5 hp and purification systems.

C. Additional Systems Required to Be Commissioned:

1. Domestic water piping, including the following:

   a. Domestic cold- and hot-water piping, fittings, and specialties inside the building.
   b. Pumps, motors, accessories, and controls.
   c. Sleeves and sleeve seals.
   d. Indoor water-storage tanks.
   e. Meters and gauges.
   f. General-duty and specialty valves.
   g. Hangers and supports.
   h. Heat tracing.
   i. Vibration isolation.

2. Sanitary waste and vent piping, including the following:

   a. Gravity and forced-main sewerage piping, fittings, and specialties.
   b. Sanitary waste interceptors.
   c. Pumps, motors, accessories, and controls.
   d. Drains.
   e. Sleeves and sleeve seals.
   f. Meters and gauges.
   g. General-duty and specialty valves.
   h. Hangers and supports.
   i. Heat tracing.
   j. Vibration isolation.

3. Storm-water piping, including the following:

   a. Drainage piping, fittings, and specialties.
   b. Pumps, motors, accessories, and controls.
   c. Drains and collection basins.
   d. Rainwater-collection and storage equipment.
   e. Sleeves and sleeve seals.
   f. Meters and gauges.
   g. General-duty and specialty valves.
   h. Hangers and supports.
   i. Heat tracing.
   j. Vibration isolation.

4. Plumbing fixtures, including the following:

a. Water closets, supports and connections, supplies, and flush valves.
b. Urinals, supports and connections, supplies, and flush valves.
c. Lavatories, supports, supplies, drain connections, and faucets.
d. Sinks, supports, supplies, drain connections, and faucets.
e. Tubs, drain connections, and faucets.
f. Showers, supplies, drain connections, and faucets.
g. Wash fountains, supplies, drain connections, and faucets.
h. Emergency plumbing fixtures, supplies, drain connections, and controls.
i. Drinking fountains, supplies, and drainage connections.

3.5 Cx TESTING PREPARATION

A. Refer to "Testing Procedures" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for preparation requirements prior to Functional Testing.

3.6 PLUMBING TESTING REQUIREMENTS

A. In addition to the requirements in the "General Testing Requirements" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems," provide the following:

1. Include entire Plumbing installation, from central equipment for heat generation through distribution systems to each conditioned space. Testing must include measuring capacities and effectiveness of operational and control functions.
2. Prepare detailed testing plans, procedures, and checklists for Plumbing systems, subsystems, and equipment in conjunction with the CxA. Contractor to ensure the participation of the Plumbing Subcontractor, Controls Subcontractor and the TAB Specialist as needed for this work.
3. If tests cannot be completed because of a deficiency outside the scope of the Plumbing system, document the deficiency and report it to the Commissioner. After deficiencies are resolved, reschedule tests.

3.7 Cx TEST CONDITIONS

A. Refer to "General Testing Requirements" Article, and "Testing Procedures" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for satisfying Cx requirements related to testing.

3.8 PLUMBING SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in individual Division 22 sections. Provide submittals, test data, inspector record, and certifications to the CxA.

B. Plumbing Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Section 220593 'Testing, Adjusting And Balancing For Plumbing' . Assist the CxA with preparation of testing plans.

3.9 Cx TESTS COMMON TO PLUMBING SYSTEMS

A. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions, to verify compliance with acceptance criteria.

B. Test systems, assemblies, subsystems, equipment, and components for operating modes, interlocks, control responses, responses to abnormal or emergency conditions, and responses compared to acceptance criteria.

C. Coordinate schedule with, and perform Cx activities at the direction of, CxA.

D. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance test requirements specified in Division 22 Sections specifying plumbing systems and equipment.

E. Provide technicians, instrumentation, tools, and equipment to perform and document the following:

1. Cx Construction Checklist verification tests.
2. Cx Construction Checklist verification test demonstrations.

3.10 TAB VERIFICATION

A. Prerequisites: Completion of "Examination" Article requirements and correction of deficiencies, as specified in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

B. Completion of "Preparation" Article requirements for preparation of a TAB plan that includes strategies and step-by-step procedures, and system-readiness checks and reports, as specified in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

C. Scope: Domestic hydronic piping systems.

D. Purpose: Differential flow relationships intended to maintain air and water pressurization differentials between the various areas of Project.

E. Prior to performance of Testing, Adjusting, and Balancing (TAB) work, provide copies of reports, sample forms, checklists, and certificates to the CxA.

F. Notify the CxA at least ten (10) days in advance of testing and balancing work and provide access for the CxA to witness testing and balancing work.

G. Provide technicians, instrumentation, and tools to verify testing and balancing of plumbing systems at the direction of the CxA.

1. The CxA will notify the Contractor ten (10) days in advance of the date of field verification. Notice will not include data points to be verified.
2. Ensure that the TAB specialist uses the same instruments (by model and serial number) that were used when original data were collected.

3. Failure of an item includes, other than sound, a deviation of more than 10 percent. Failure of more than 10 percent of selected items will result in rejection of final testing, adjusting, and balancing report. For sound pressure readings, a deviation of 3 dB will result in rejection of final testing. Variations in background noise must be considered.
4. Remedy the deficiency and notify the CxA to perform verification of failed portions.

3.11 CX TESTS FOR DOMESTIC WATER SYSTEMS

A. Pressure Control:

1. Prerequisites: Installation verification and startup of the following:

   a. Startup of booster pump and pressure reducing valve stations.
   b. Adjustment of balancing valves and flow verification at heat exchangers.

2. Scope: Domestic Water System
3. Purpose: Pressure control throughout system, especially furthest point per each zone.
4. Conditions of the Test:

   a. Simulate load on the system, considering safety to building and occupants.

5. Acceptance criteria:

   a. Adequate pressure is witnessed at furthest points per zone while load is applied to the system.

B. Temperature Control:

1. Prerequisites: Installation verification and startup of the following:

   a. Startup of domestic heater.
   b. Startup of circulation pumps.
   c. Startup of the hot water temperature maintenance and monitoring system, cables and sensors.
   d. Adjustment of balancing valves and flow verification at heat exchangers.

2. Scope: Domestic Water System
3. Purpose: temperature control throughout system, especially furthest point per each zone.
4. Conditions of the Test:

   a. Simulate load on the system, considering safety to building and occupants.

5. Acceptance criteria:

   a. Adequate temperature of 110 deg F is witnessed at furthest points per zone while load is in applied to the system.

3.12 GUARANTY REVIEW / SEASONAL TESTING

A. Refer to "Guaranty Review / Seasonal Testing" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for guaranty review and seasonal testing requirements.

END OF SECTION 220800

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Copper tube and fittings - domestic water.
2. Ductile-iron pipe and fittings - domestic water.
3. Encasement for piping - domestic water.
4. Dielectric fittings - domestic water.

B. Related Requirements:

1. Section 331415 "Site Water Distribution Piping" for water-service piping and water meters outside the building from source to the point where water-service piping enters the building.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Coordination Drawings: Piping layout, or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.

1.5 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: Installers of pressure-sealed joints are to be certified by pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings.

1.7 WARRANTY

A. Polypropylene (PP-R and PP-RCT) Pipe and Fittings Manufacturer's Warranty: Manufacturer agrees to repair or replace PP-R and PP-RCT pipe and fittings that fail in materials or workmanship.

1. Warranty is to cover labor and material costs of repairing and/or replacing defective materials and repairing any incidental damage caused by failure of piping system due to defects in materials or manufacturing.
2. Warranty is to be in effect only upon submission by Contractor to the manufacturer of valid pressure/leak documentation indicating that system was tested and passed manufacturer's pressure/leak test.
3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Domestic water piping, tubing, fittings, joints, and appurtenances intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act and with NSF 61 and NSF 372, or be certified in compliance with NSF 61 and NSF 372 by an ANSI-accredited third-party certification body, in that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

2.2 PIPING MATERIALS

A. Potable-water piping and components are to comply with NSF 14, NSF 61, and NSF 372.

2.3 COPPER TUBE AND FITTINGS - DOMESTIC WATER

A. Drawn-Temper Copper Tube: ASTM B88, Type L.

B. Annealed-Temper Copper Tube: ASTM B88, Type L.

C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, pressure fittings. Do not use solder joints on pipe sizes greater than NPS 4.

D. Wrought Copper Unions: ASME B16.22. Do not use solder joints on pipe sizes greater than NPS 4.

2.4 DUCTILE-IRON PIPE AND FITTINGS - DOMESTIC WATER

A. Mechanical-Joint, Ductile-Iron Pipe:

1. AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Push-on-Joint, Ductile-Iron Pipe:

1. AWWA C151/A21.51.
2. Push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.

C. Compact-Pattern, Push-on-Joint Fittings:

1. AWWA C153/A21.53, ductile iron.
2. Gaskets: AWWA C111/A21.11, rubber.

2.5 ENCASEMENT FOR PIPING - DOMESTIC WATER

A. Standard: ASTM A674 or AWWA C105/A21.5.

B. Form: Sheet or tube.

2.6 DIELECTRIC FITTINGS - DOMESTIC WATER

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Flanges - Domestic Water:

1. Source Limitations: Obtain dielectric flanges from single manufacturer
2. Standard: ASSE 1079.
3. Factory-fabricated, bolted, companion-flange assembly.
4. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

C. Dielectric Nipples - Domestic Water:

1. Source Limitations: Obtain dielectric nipples from single manufacturer.
2. Standard: IAPMO PS 66.
3. Electroplated steel nipple complying with ASTM F1545.
4. Pressure Rating and Temperature: 300 psig at 225 deg F.
5. End Connections: Male threaded or grooved.
6. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Under-building-slab, domestic water, building-service piping, NPS 3 and smaller is to be the following:

1. Annealed-temper copper tube, ASTM B88, Type L; wrought-copper, solder-joint fittings; and brazed, copper pressure-seal fittings; and pressure-sealed joints.

E. Under-building-slab, domestic water, building-service piping, NPS 4 to NPS 8 and larger is to be the following:
1. Mechanical-joint, ductile-iron pipe; standard- or compact- pattern, mechanical-joint fittings; and mechanical joints.
2. Push-on-joint, ductile-iron pipe; standard- or compact-pattern, push-on-joint fittings; and gasketed joints.
3. Plain-end, ductile-iron pipe; grooved-joint, ductile-iron-pipe appurtenances; and grooved joints.

F. Under-building-slab, combined domestic water, building-service, and fire-service-main piping, NPS 6 to NPS 12 is to be the following:

1. Mechanical-joint, ductile-iron pipe; standard- or compact-pattern, mechanical-joint fittings; and mechanical joints.
2. Push-on-joint, ductile-iron pipe; standard- or compact-pattern, push-on-joint fittings; and gasketed joints.
3. Plain-end, ductile-iron pipe; grooved-joint, ductile-iron-pipe appurtenances; and grooved joints.

G. Under-building-slab, domestic water piping, NPS 2 and smaller is to be the following:

1. Drawn-temper or annealed-temper copper tube, ASTM B88, Type L; wrought-copper, solder-joint fittings; and brazed, copper pressure-seal-joint fittings; and pressure-sealed joints.

H. Aboveground domestic water piping, NPS 2 and smaller is to be the following:
1. Drawn-temper copper tube, ASTM B88, Type L; cast- or wrought-copper, solder-joint fittings; and soldered joints.

I. Aboveground domestic water piping, NPS 2-1/2 to NPS 4 is to be the following:

1. Drawn-temper copper tube, ASTM B88, Type L; cast- or wrought-copper, solder-joint fittings; and soldered joints.

J. Aboveground domestic water piping, NPS 2-1/2 to NPS 4 is to be the following:

1. Drawn-temper copper tube, ASTM B88, Type L; cast- or wrought-copper, solder-joint fittings; and soldered joints.

3.3 INSTALLATION OF PIPING

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab in accordance with CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints in accordance with AWWA C600 and AWWA M41.

D. Install underground copper tube and ductile-iron pipe in PE encasement in accordance with ASTM A674 or AWWA C105/A21.5.

E. Install valves in accordance with Section 220523 "General-Duty Valves for Plumbing Piping."

F. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 221119 "Domestic Water Piping Specialties."

G. Install domestic water piping level with 0.25 percent slope downward toward drain without pitch and plumb.

H. Rough-in domestic water piping for water-meter installation in accordance with utility company's requirements.

I. Install seismic restraints on piping.

J. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

K. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

L. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

M. Install piping to permit valve servicing.

N. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

O. Install piping free of sags and bends.

P. Install fittings for changes in direction and branch connections.

Q. Install PEX tube with loop at each change of direction of more than 90 degrees.

R. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

S. Install pressure gauges on suction and discharge piping for each plumbing pump and packaged booster pump.

T. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 221123.21 "Inline, Domestic Water Pumps."

U. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements for thermometers in Section 220500 "Common Work Results for Plumbing."

V. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220500 "Common Work Results for Plumbing."

W. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220500 "Common Work Results for Plumbing."

X. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220500 "Common Work Results for Plumbing."

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B813, water-flushable flux to end of tube. Join copper tube and fittings in accordance with ASTM B828 or CDA's "Copper Tube Handbook."

F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools and procedure recommended by pressure-seal-fitting manufacturer. Leave insertion marks on pipe after assembly.

G. Push-on Joints for Copper Tubing: Clean end of tube. Measure insertion depth with manufacturer's depth gage. Join copper tube and push-on-joint fittings by inserting tube to measured depth.

H. Extruded-Tee Connections: Form tee in copper tube in accordance with ASTM F2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

I. Joint Construction for Grooved-End Copper Tubing: Make joints in accordance with AWWA C606. Roll groove ends of tubes. Lubricate and install gasket over ends of tubes or tube and fitting. Install coupling housing sections over gasket with keys seated in tubing grooves. Install and tighten housing bolts.

J. Joint Construction for Grooved-End, Ductile-Iron Piping: Make joints in accordance with AWWA C606. Cut round-bottom grooves in ends of pipe at gasket-seat dimension required for specified (flexible or rigid) joint. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket with keys seated in piping grooves. Install and tighten housing bolts.

K. Joint Construction for Grooved-End Steel Piping: Make joints in accordance with AWWA C606. Roll groove ends of pipe as specified. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket with keys seated in piping grooves. Install and tighten housing bolts.

L. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts in accordance with ASME B31.9.

M. Joint Construction for Solvent-Cemented Plastic Piping: Clean and dry joining surfaces. Join pipe and fittings in accordance with the following:

1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.

N. Joints for PEX Tubing, ASTM: Join in accordance with ASTM F1807 for metal insert and copper crimp ring fittings and ASTM F1960 for cold expansion fittings and reinforcing rings.

O. Joints for PEX Tubing, ASSE: Join in accordance with ASSE 1061 for push-fit fittings.

P. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.5 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for hangers, supports, and anchor devices in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Install hangers for copper, ductile iron, galvanized steel and stainless steel tube and pipe, with maximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58, and NYC Building Code whichever are most stringent.

C. Install vinyl-coated hangers for CPVC, PVC and PP-R/PP-RCT pipe, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, NYC Building code requirements, whichever are most stringent.

D. Install vinyl-coated hangers for PEX tubing, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, NYC Building code requirements, whichever are most stringent.

E. Support horizontal piping within 12 inches of each fitting.

F. Support vertical runs of copper, ductile iron, galvanized steel and stainless steel tube and pipe to comply with MSS-58, NYC Building code requirements, whichever are most stringent.

G. Support vertical runs of CPVC, PVC and PP-R/PP-RCT pipe to comply with manufacturer's written instructions, NYC Building code requirements, whichever are most stringent.

H. Support vertical runs of PEX tube to comply with manufacturer's written instructions, NYC Building code requirements, whichever are most stringent.

3.6 PIPING CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by NYC Plumbing Code.
4. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.7 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

3.8 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by the New York City Plumbing Code; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
b. Fill and isolate system in accordance with either of the following:

1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
d. Repeat procedures if biological examination shows contamination.
e. Submit water samples in sterile bottles to certified laboratory facility.

B. Clean non-potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging procedures prescribed by the New York City Plumbing Code or; if methods are not prescribed, follow procedures described below:

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
b. Submit water samples in sterile bottles. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.9 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.10 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Piping Inspections:

a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by NYC Department of Buildings inspector.

b. During installation, notify Commissioner and the NYC Department of Buildings at least 72 hours before inspection must be made. Perform tests specified below in presence of the Commissioner or representatives of the NYC Department of Buildings:

1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after installation and before setting fixtures.
2) Final Inspection: Arrange for the NYC Department of Buildings inspector and Commissioner to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

c. Reinspection: If the NYC Department of Buildings inspectors find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
d. Reports: Prepare inspection reports and have them signed by the NYC Department of Buildings inspectors.

2. Piping Tests:

a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Hydrostatic testing and documentation of test results for polypropylene (PP-R and PP-RCT) pipe to be in accordance with manufacturer's written instructions and submitted to manufacturer upon successful completion per warranty requirements.
f. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
g. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 221116

SECTION 221117 - GRAY-WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Copper tube and fittings.
2. Piping joining materials.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Water Piping Minimum Working Pressure: 50 psig unless otherwise indicated.

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B88, Type L water tube, drawn temper.

B. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

2.3 PIPING JOINING MATERIALS

A. Solder Filler Metals: ASTM B32, lead-free alloys.

B. Flux: ASTM B813, water flushable.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for gray-water piping to verify actual locations of piping connections before equipment installation.

C. Examine walls, floors and roofs for suitable conditions where gray-water piping will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF PIPING

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of gray-water water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install underground copper tube in PE encasement according to ASTM A674 or AWWA C105/A21.5.

D. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

E. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

F. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

G. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

H. Install piping to permit valve servicing.

I. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

J. Install piping free of sags and bends.

K. Install fittings for changes in direction and branch connections.

L. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

M. Install sleeves for piping penetrations of walls, ceilings, and floors.

N. Install sleeve seals for piping penetrations of concrete walls and slabs.

O. Install escutcheons for piping penetrations of walls, ceilings, and floors.

P. Install pressure gauges on suction and discharge piping for each plumbing pump and packaged booster pump.

Q. Install shutoff valve, hose-end drain valve, strainer, pressure gauge, and test tee with valve inside the building at each gray-water water-service entrance. Comply with requirements for pressure gauges in and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."

R. Install shutoff valve immediately upstream of each dielectric fitting.

S. Install gray-water water piping level with 0.25 percent slope downward toward drain and plumb.

T. Install pressure gauges on suction and discharge piping for each plumbing pump. Comply with requirements for pressure gauges.

U. Comply with requirements for pipe hangers and supports specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

3.4 WATER PIPE JOINT CONNECTIONS

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B828 or CDA's "Copper Tube Handbook."

F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.

G. Push-on Joints for Copper Tubing: Clean end of tube. Measure insertion depth with manufacturer's depth gaUge. Join copper tube and push-on-joint fittings by inserting tube to measured depth.

H. Extruded-Tee Connections: Form tee in copper tube according to ASTM F2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

I. Joint Construction for Grooved-End Copper Tubing: Make joints according to AWWA C606. Roll groove ends of tubes. Lubricate and install gasket over ends of tubes or tube and fitting. Install coupling housing sections over gasket with keys seated in tubing grooves. Install and tighten housing bolts.

J. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for gray-water water service. Join flanges with gasket and bolts according to ASME B31.9.

K. Joint Construction for Solvent-Cemented Plastic Piping: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
2. PVC Piping: Join according to ASTM D2855.

L. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.5 INSTALLATION OF TRANSITION FITTINGS

A. Install transition couplings at joints of dissimilar piping.

B. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in ODs.
2. In Drainage Piping: Unshielded, nonpressure transition couplings.
3. In Aboveground Force Main Piping: Fitting-type transition couplings.
4. In Underground Force Main Piping:

   a. NPS 1-1/2 and Smaller: Fitting-type transition couplings.
   b. NPS 2 and Larger: Pressure transition couplings.

C. Transition Fittings in Aboveground Gray-Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings.

D. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for NPS 2and Smaller: Use dielectric nipples, unions.
3. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges, flange kits, nipples.

E. Dielectric Fittings for NPS 5and Larger: Use dielectric flange kits.

3.6 INSTALLATION OF VALVES

A. General valve installation requirements are specified in Section 220523 "General-Duty Valves for Plumbing Piping."

B. Shutoff Valves:

1. Install gate or full-port ball valve for piping NPS 2 and smaller.
2. Install gate valve for piping NPS 2-1/2 and larger.

C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.

3.7 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for pipe hanger, supports, and anchor devices in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

a. 100 Feetand Less: MSS Type 1, adjustable, steel clevis hangers.
b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install hangers for copper tubing with maximum horizontal spacing and minimum rod diameters to comply with MSS-58 and the requirements of the NYC Building Code, whichever are most stringent.

C. Install vinyl-coated hangers for PVC and PP piping, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions and the requirements of the NYC Building Code, whichever are most stringent.

D. Support horizontal piping within 12 inches of each fitting and coupling.

E. Support vertical runs of copper tubing to comply with MSS-58 and the requirements of the NYC Building Code, whichever are most stringent.

F. Support vertical runs of PVC and PP piping to comply with manufacturer's written instructions and the requirements of the NYC Building Code, whichever are most stringent.

3.8 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

C. Label all non-potable water piping "NON-POTABLE, DO NOT DRINK."

3.9 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

   a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
   b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

END OF SECTION 221117

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Vacuum breakers.
2. Backflow preventers.
3. Automatic water shutoff valve systems.
4. Balancing valves.
5. Hose bibbs.
6. Wall hydrants.
7. Drain valves.
8. Water-hammer arresters.
9. Trap-seal primer device.
10. Trap-seal primer systems.
11. Water meters.

B. Related Requirements:

1. Section 220500 "Common Work Results for Plumbing."
2. Section 221116 "Domestic Water Piping" for water meters.

1.3 DEFINITIONS

A. AMI: Advanced Metering Infrastructure.

B. AMR: Automatic Meter Reading.

C. FKM: A family of fluoroelastomer materials defined by ASTM D1418.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For domestic water piping specialties.

1. Include diagrams for power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

A. Test and inspection reports.

B. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Domestic water piping specialties intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), NSF 61 and NSF 372, or to be certified in compliance with NSF 61 and NSF 372 by an American National Standards Institute (ANSI)-accredited third-party certification body that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Apollo Flow Controls; Conbraco Industries, Inc.
b. FEBCO; A WATTS Brand.
c. WATTS.
d. Zurn Industries, LLC.
e. Or approved equal.

2. Standard: ASSE 1001.

3. Size: NPS 1/4 to NPS 3, as required to match connected piping.
4. Body: Bronze.
5. Inlet and Outlet Connections: Threaded.
6. Finish: Chrome plated.

2.4 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Apollo Flow Controls; Conbraco Industries, Inc.
   b. FEBCO; A WATTS Brand.
   c. WATTS.
   d. Zurn Industries, LLC.
   e. Or approved equal.

2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Size.
5. Accessories:

   a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
   b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
   c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

B. Double-Check, Backflow-Prevention Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Apollo Flow Controls; Conbraco Industries, Inc.
   b. FEBCO; A WATTS Brand.
   c. WATTS.
   d. Zurn Industries, LLC.
   e. Or approved equal.

2. Standard: ASSE 1015.
3. Operation: Continuous-pressure applications unless otherwise indicated.
4. Configuration: Designed for horizontal, straight-through flow.
5. Accessories:

   a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
   b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.

2.5 HOSE BIBBS

A. Hose Bibbs:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Jay R. Smith Mfg Co; a division of Morris Group International.
    b. MIFAB, Inc.
    c. Prier Products, Inc.
    d. WATTS.
    e. Or approved equal.

2. Standard: ASME A112.18.1 for sediment faucets.
3. Body Material: Bronze.
4. Seat: Bronze, replaceable.
5. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
6. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
7. Pressure Rating: 125 psig.
8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
9. Finish for Finished Rooms: Chrome or nickel plated.
10. Operation for Equipment Rooms: Wheel handle or operating key.
11. Include operating key with each operating-key hose bibb.
12. Include integral wall flange with each chrome- or nickel-plated hose bibb.
13. Nonfreeze Wall Hydrants
14. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Jay R. Smith Mfg Co; a division of Morris Group International.
    b. MIFAB, Inc.
    c. Prier Products, Inc.
    d. WATTS.
    e. Zurn Industries, LLC.
    f. Or approved equal.
15. Pressure Rating: 125 psig.
16. Operation: Loose key.
17. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
18. Inlet: NPS 3/4 or NPS 1.

2.6 TRAP-SEAL PRIMER DEVICE

A. Supply-Type, Trap-Seal Primer Device:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Jay R. Smith Mfg Co; a division of Morris Group International.
    b. Josam Company.
    c. MIFAB, Inc.
    d. Sioux Chief Manufacturing Company, Inc.
    e. Or approved equal.

2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.

6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.7 TRAP-SEAL PRIMER SYSTEMS

A. Trap-Seal Primer Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Precision Plumbing Products.
   b. Sioux Chief Manufacturing Company, Inc.
   c. Zurn Industries, LLC.
   d. Or approved equal.

2. Standard: ASSE 1044.
3. Inlet Size: NPS 3/4, ASTM B88, Type L; copper, water tubing.
4. Cabinet: Recessed-mounted steel box with stainless steel cover.
5. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120 V ac power.

   a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

6. Vacuum Breaker: ASSE 1001.
7. Size Outlets: NPS 1/2.

2.8 WATER METERS

A. Ultrasonic-Type Water Meters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Badger Meter, Inc.
   b. Master Meter, Inc.
   c. Neptune Technology Group Inc.
   d. Or approved equal.

2. Standard: Applicable portions of AWWA C700.
3. Body Design: Ultrasonic open flow tube; totalization meter.
4. Registration: In gallons or cubic feet as required by utility company.

   a. Remote Registration System: Encoder type complying with AWWA C707; modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.

      1) System to be capable of transmitting data using AMR/AMI technology.

5. End Connections: Threaded or flanged.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF PIPING SPECIALTIES

A. Backflow Preventers: Install in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with the requirements of the NYC Plumbing Code and the NYC DEP.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
3. Do not install bypass piping around backflow preventers.

B. Automatic Water Shutoff Valves: Test for signal strength before valve installation. Install automatic shutoff valve downstream from main domestic water shutoff valve. Install valve controller in an accessible location with sensors in areas where water is likely to accumulate.

C. Balancing Valves: Install in locations where they can easily be adjusted. Set at indicated design flow rates.

D. Water-Hammer Arresters: Install in water piping in accordance with PDI-WH 201.

E. Supply-Type, Trap-Seal Primer Device: Install with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

F. Trap-Seal Primer Systems: Install with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

3.3 PIPING CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping specialties adjacent to equipment and machines, allow space for service and maintenance.

3.4 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

3.5 CONTROL CONNECTIONS

A. Connect control wiring.

3.6 IDENTIFICATION

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.7 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

D. Adjust each pressure vacuum breaker, reduced-pressure-principle backflow preventer, double-check, backflow-prevention assembly and double-check, detector-assembly backflow preventer in accordance with manufacturer's written instructions and the device's reference standard.

END OF SECTION 221119

SECTION 221123.13 - DOMESTIC-WATER PACKAGED BOOSTER PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Multiplex, constant-speed booster pump

1.3 DEFINITIONS

A. PID: Proportional Integral Derivative.

B. VFC: Variable-frequency controller.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, and dimensions of individual components and profiles.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For booster pumps.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: Certificates, for booster pumps, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For booster pumps to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Retain protective coatings and flange's protective covers during storage.

1.10 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.11 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement booster pump equipment, material and accessories that do not comply with specified requirements.

B. Warranty Period: 1 year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Drinking Water System Components - Health Effects and Drinking Water System Components - Lead Content Compliance: NSF 61 and NSF 372.

B. Seismic Performance: Booster pumps must withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the booster pump will remain in place without separation of any parts from the booster pump when subjected to the seismic forces specified ".

2.2 MULTIPLEX, CONSTANT-SPEED BOOSTER PUMPS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flowtronex; a brand of Motor Controls, Inc.
2. SyncroFlo, Inc.
3. Thrush Co. Inc.
4. TIGERFLOW Systems, Inc.
5. Or approved equal.

B. Description: Factory-assembled and -tested, fluid-handling system for domestic water, with pumps, piping, valves, specialties, and controls, and mounted on base.

C. Valves:

1. Shutoff Valves NPS 2 and Smaller: Gate valve or two-piece, full-port ball valve, in each pump's suction and discharge piping.
2. Shutoff Valves NPS 2-1/2 and Larger: Gate valve or lug-type butterfly valve, in each pump's suction and discharge piping and in inlet and outlet headers.
3. Thermal-Relief Valve: Temperature-and-pressure relief type in pump's discharge header piping.

D. Dielectric Fittings: With insulating material to isolate joined dissimilar metals.

E. Base: Structural steel.

2.3 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors.

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in NFPA 70.

2.4 SOURCE QUALITY CONTROL

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

B. ASME Compliance: Comply with ASME B31.9 for piping.

C. UL Compliance for Packaged Pumping Systems:

1. UL 508, "Industrial Control Equipment."
2. UL 508A, "Industrial Control Panels."
3. UL 778, "Motor-Operated Water Pumps."
4. UL 1995, "Heating and Cooling Equipment."

D. Booster pumps must be listed and labeled as packaged pumping systems by qualified testing agency.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine roughing-in for booster pumps to verify actual locations of piping connections before booster-pump installation.

3.3 INSTALLATION

A. Booster-Pump Mounting:

1. Install booster pumps on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

B. Support connected domestic-water piping so weight of piping is not supported by booster pumps.

3.4 ELECTRICAL CONNECTIONS

A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

3.5 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring.

3.6 IDENTIFICATION

A. Identify system components. Comply with requirements for identification.

B. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."

2. Nameplate must be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.7 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.8 ADJUSTING

A. Adjust booster pumps to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust pressure set points.

C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting booster pump to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate booster pumps.

END OF SECTION 221123.13

SECTION 221123.21 - INLINE, DOMESTIC-WATER PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. In-line, sealless centrifugal pumps.

B. Related Requirements:

1. Section 221123.13 "Domestic-Water Packaged Booster Pumps" for booster systems.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction materials, rated capacities, certified performance curves with operating points plotted on curves, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals:

1. Product Data: For pump controls.

C. Coordination Drawings: Detail pumps and adjacent equipment. Show support locations, type of support, weight on each support, required clearances, and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Structural members to which pumps will be attached.
2. Size and location of initial access modules for acoustical tile.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: Certificates, for inline, domestic-water pumps, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For inline, domestic-water pumps to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with pump manufacturer's written instructions for handling.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. UL Compliance: UL 778 for motor-operated water pumps.

C. Drinking Water System Components - Health Effects and Drinking Water System Components - Lead Content Compliance: NSF 61 and NSF 372.

D. Seismic Performance: Inline, domestic-water pumps must withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Component Importance Factor: 1.5.

2.2 IN-LINE, SEALLESS CENTRIFUGAL PUMPS

A. Description: Factory-assembled and -tested, in-line, close-coupled, canned-motor, sealless, overhung-impeller centrifugal pumps.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Grundfos Pumps Corp.
2. TACO Comfort Solutions, Inc.
3. WILO USA LLC - WILO Canada Inc.
4. Or approved equal.

C. Pump Construction:

1. Pump and Motor Assembly: Hermetically sealed, replaceable-cartridge type with motor and impeller on common shaft and designed for installation with pump and motor shaft horizontal.
2. Minimum Working Pressure: 125 psig.
3. Maximum Continuous Operating Temperature: 220 deg F.
4. Casing: Cast iron, with threaded or companion-flange connections.
5. Impeller: stainless steel.
6. Motor: Single speed.

2.3 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors.

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

2.4 CONTROLS

A. Pressure Switches: Electric, adjustable for control of water-supply pump.

1. Type: Water-immersion pressure sensor, for installation in piping.
2. Enclosure: NEMA 250, Type 4X.
3. Operation of Pump: On or off.
4. Transformer: Provide if required.
5. Power Requirement: 120 V ac.

B. Timers: Electric, for control of hot-water circulation pump.

1. Type: Programmable, seven-day clock with manual override on-off switch.
2. Enclosure: NEMA 250, Type 1, suitable for wall mounting.

3. Operation of Pump: On or off.
4. Transformer: Provide if required.
5. Power Requirement: 120 V ac.
6. Programmable Sequence of Operation: Up to two on-off cycles each day for seven days

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine roughing-in for domestic-water-piping system to verify actual locations of piping connections before pump installation.

3.3 INSTALLATION OF PUMPS

A. Comply with HI 1.4.

B. Mount pumps in orientation complying with manufacturer's written instructions.

C. Pump Mounting:

1. Install vertically mounted, in-line, close-coupled centrifugal pumps with cast-iron base mounted on concrete base using vibration isolation type and deflection. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Install continuous-thread hanger rods and vibration isolation of size required to support pump weight.

1. Comply with requirements for vibration isolation devices. Fabricate brackets or supports as required.
2. Comply with requirements for hangers and supports specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

E. Install pressure switches in water-supply piping.

F. Install thermostats in hot-water return piping.

G. Install timers on wall in engineer's office.

H. Install time-delay relays in piping between water heaters and hot-water storage tanks.

3.4 PIPING CONNECTIONS

A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to inline, domestic-water pumps, allow space for service and maintenance.

C. Connect domestic-water piping to pumps. Install suction and discharge piping equal to or greater than size of pump nozzles.

1. Install flexible connectors adjacent to pumps in suction and discharge piping of the following pumps:

a. Comply with requirements for flexible connectors specified in Section 221116 "Domestic Water Piping."

D. Install shutoff valve and strainer on suction side of each pump, and check, shutoff, and throttling valves on discharge side of each pump. Install valves same size as connected piping. Comply with requirements for strainers specified in Section 221119 "Domestic Water Piping Specialties." Comply with requirements for valves specified in Section 220523 "General-Duty Valves for Plumbing Piping."

1. Install pressure gauge and snubber at suction of each pump and pressure gauge and snubber at discharge of each pump. Install at integral pressure-gauge tappings where provided or install pressure-gauge connectors in suction and discharge piping around pumps. Comply with requirements for pressure gauges and snubbers.

3.5 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring between temperature controllers and devices.

C. Interlock pump between water heater and hot-water storage tank with water heater burner and time-delay relay.

3.6 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment" for identification of pumps.

3.7 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Check piping connections for tightness.
3. Clean strainers on suction piping.
4. Set pressure switches, thermostats, timers, and time-delay relays for automatic starting and stopping operation of pumps.

5. Perform the following startup checks for each pump before starting:

    a. Verify bearing lubrication.
    b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
    c. Verify that pump is rotating in the correct direction.

6. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
7. Start motor.
8. Open discharge valve slowly.
9. Adjust temperature settings on thermostats.
10. Adjust timer settings.

3.8 ADJUSTING

A. Adjust inline, domestic-water pumps to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust initial temperature set points.

C. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

END OF SECTION 221123.21

SECTION 221313 - FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Hub-and-spigot, cast-iron soil pipe and fittings.
2. Hubless cast-iron soil pipe and fittings.
3. Backwater valves.
4. Cleanouts.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Pipe and fittings.
2. Non-pressure and pressure couplings
3. Expansion joints and deflection fittings.
4. Backwater valves.

B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

1.5 SUBMITTAL PROCEDURES

A. Coordination Drawings:

1. Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewer system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

2. Show system piping in profile. Draw profiles to horizontal scale of not less than 1 inch equals 50 feet and to vertical scale of not less than 1 inch equals 5 feet . Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of pipe and fitting.

B. Field quality-control reports.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle manholes according to manufacturer's written rigging instructions.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service and Extra-Heavy classes.

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.2 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A888 or CISPI 301.

B. Cast-Iron, Shielded Couplings:

1. Description: ASTM C1277 with ASTM A48/A48M, two-piece, cast-iron housing; stainless-steel bolts and nuts; and ASTM C564, rubber sleeve with integral, center pipe stop.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ANACO-Husky.
b. Charlotte Pipe and Foundry Company.
c. Tyler Pipe; a subsidiary of McWane Inc.
d. Or approved equal.

2.3 BACKWATER VALVES

A. Cast-Iron Backwater Valves:

1. Description: ASME A112.14.1, gray-iron body and bolted cover, with bronze seat.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Josam Company.
    b. Smith, Jay R. Mfg. Co.
    c. Watts; a Watts Water Technologies company.
    d. Zurn Industries, LLC.
    e. Or approved equal.

3. Horizontal type; with swing check valve and hub-and-spigot ends.
4. Combination horizontal and manual gate-valve type; with swing check valve, integral gate valve, and hub-and-spigot ends.
5. Terminal type; with bronze seat, swing check valve, and hub inlet.

2.4 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Josam Company.
    b. Smith, Jay R. Mfg. Co.
    c. Watts; a Watts Water Technologies company.
    d. Zurn Industries, LLC.
    e. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.3 PIPING INSTALLATION

A. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

B. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

D. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

E. Install gravity-flow, nonpressure, drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of percent unless otherwise indicated.
2. Install piping NPS5 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
3. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
4. Install hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook."

F. Install force-main, pressure piping according to the following:

1. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.

G. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105/A21.5:

1. Hub-and-spigot, cast-iron soil pipe.
2. Hubless cast-iron soil pipe and fittings.

H. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.4 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure, drainage piping according to the following:

1. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
2. Join ductile-iron, gravity sewer piping according to AWWA C600 for push-on joints.
3. Join ABS sewer piping according to ASTM D 2321 for elastomeric-seal joints.
4. Join PVC cellular-core sewer piping according to ASTM D 2321 and ASTM F 891 for solvent-cemented joints.
5. Join PVC corrugated sewer piping according to ASTM D 2321.
6. Join PVC profile sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
7. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.

8. Join PVC gravity sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
9. Join fiberglass sewer piping according to ASTM D 4161 for elastomeric-seal joints.
10. Join nonreinforced-concrete sewer piping according to ASTM C 14 and ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
11. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
12. Join dissimilar pipe materials with nonpressure-type, flexible or rigid couplings.

B. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.

   a. Unshielded, shielded, flexible or rigid couplings for pipes of same or slightly different OD.
   b. Unshielded, increaser/reducer-pattern, flexible or rigid couplings for pipes with different OD.

2. Use pressure pipe couplings for force-main joints.

3.5 BACKWATER VALVE INSTALLATION

A. Install horizontal-type backwater valves in piping manholes or pits.

B. Install terminal-type backwater valves on end of piping and in manholes. Secure units to sidewalls.

3.6 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

B. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.

C. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.

D. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.7 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Secion 221316 "Sanitary Waste and Vent Piping."

B. Connect force-main piping to building's sanitary force mains specified in Section 221316 "Sanitary Waste and Vent Piping." Terminate piping where indicated.

C. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi .
2. Make branch connections from side into existing piping, NPS 4 to NPS 20 . Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi .
3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of, and be flush with, inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
   a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8 IDENTIFICATION

A. Comply with requirements in Section 312000 "Earth Moving" for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.

1. Use warning tape or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.9 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate report for each system inspection.
2. Defects requiring correction include the following:

   a. Alignment: Less than full diameter of inside of pipe is visible between structures.
   b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
   c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
   d. Infiltration: Water leakage into piping.
   e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or rectified, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of the NYC Plumbing Code.
3. Schedule tests and inspections by the NYC Department of Buildings inspectors with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Hydrostatic Tests: Test sanitary sewerage according to requirements of the NYC Plumbing Code and the following:

    a. Fill sewer piping with water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
    b. Close openings in system and fill with water.
    c. Purge air and refill with water.
    d. Disconnect water supply.
    e. Test and inspect joints for leaks.

6. Air Tests: Test sanitary sewerage according to requirements of the NYC Plumbing Code, UNI-B-6, and the following:

    a. Test plastic gravity sewer piping according to ASTM F 1417.
    b. Test concrete gravity sewer piping according toASTM C 1628.

7. Force Main: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than 150 psig.

    a. Ductile-Iron Piping: Test according to AWWA C600, "Hydraulic Testing" Section.
    b. PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.10 CLEANING

A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION 221313

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Hub-and-spigot, cast-iron soil pipe and fittings.
2. Hubless, cast-iron soil pipe and fittings.

B. Related Requirements:

1. Section 221313 "Facility Sanitary Sewers" for sanitary sewerage piping and structures outside the building.
2. Section 221329 "Sanitary Sewerage Pumps" for effluent and sewage pumps.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For hubless, single-stack drainage system. Include plans, elevations, sections, and details.

D. Coordination Drawings: Plans and elevations, or Building Information Model (BIM) drawn to scale, showing items described in this Section and coordinated with all building trades.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Components and installation are capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10 ft. head of water.
2. Waste, Force-Main Piping: 50 psig.

B. Seismic Performance: Soil, waste, and vent piping and support and installation to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.2 PIPING MATERIALS

A. Piping materials to bear label, stamp, or other markings of specified testing agency.

B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AB & I Foundry; a part of the McWane family of companies.
2. Charlotte Pipe and Foundry Company.
3. Tyler Pipe; a part of McWane family of companies.
4. Or approved equal.

B. Pipe and Fittings:

1. Marked with CISPI collective trademark.

2. ASTM A74, extra-heavy cast iron.

C. Gaskets: ASTM C564, rubber.

D. Caulking Materials: ASTM B29, pure lead and oakum or hemp fiber.

2.4 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings:

1. Marked with CISPI collective trademark.
2. ASTM A888 or CISPI 301.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.3 INSTALLATION OF PIPING

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.

1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
2. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices.

K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.

1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
2. Use long-turn, double Y-branch, and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.

    a. Straight tees, elbows, and crosses may be used on vent lines.

3. Do not change direction of flow more than 90 degrees.
4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.

    a. Reducing size of waste piping in direction of flow is prohibited.

L. Lay buried building waste piping beginning at low point of each system.

1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
3. Maintain swab in piping and pull past each joint as completed.

M. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Waste: Two percent downward in direction of flow for piping NPS 3 and smaller; 2 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Waste Piping: Two percent downward in direction of flow.
3. Vent Piping: One percent down toward vertical fixture vent or toward vent stack.

N. Install cast-iron soil piping in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping in accordance with ASTM A674 or AWWA C105/A 21.5.

O. Install steel piping in accordance with applicable plumbing code.

P. Install stainless-steel piping in accordance with ASME A112.3.1 and applicable plumbing code.

Q. Install aboveground copper tubing in accordance with CDA's "Copper Tube Handbook."

R. Install aboveground ABS piping in accordance with ASTM D2661.

S. Install aboveground PVC piping in accordance with ASTM D2665.

T. Install underground ABS and PVC piping in accordance with ASTM D2321.

U. Install engineered soil and waste and vent piping systems as follows:

1. Combination Waste and Vent: Comply with standards of the New York City Plumbing Code.
2. Hubless, Single-Stack Drainage System: Comply with ASME B16.45 and hubless, single-stack aerator fitting manufacturer's written installation instructions.
3. Reduced-Size Venting: Comply with standards of the New York City Plumbing Code.

V. Install underground, ductile-iron, force-main piping according to AWWA C600.

1. Install buried piping inside building between wall and floor penetrations and connection to sanitary sewer piping outside building with restrained joints.
2. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.
3. Install encasement on piping in accordance with ASTM A674 or AWWA C105/A 21.5.

W. Install underground, copper, force-main tubing in accordance with CDA's "Copper Tube Handbook."

1. Install encasement on piping in accordance with ASTM A674 or AWWA C105/A 21.5.

X. Install force mains at elevations indicated.

Y. Plumbing Specialties:

1. Install backwater valves in sanitary waster gravity-flow piping.

   a. Comply with requirements for backwater valves specified in Section 221319 "Sanitary Waste Piping Specialties."

2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.

   a. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.
   b. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."

3. Install drains in sanitary waste gravity-flow piping.

   a. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

Z. Do not enclose, cover, or put piping into operation until it is inspected and approved by inspectors of the NYC Department of Buildings.

AA. Install sleeves for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for sleeves specified in Section 220500 "Common Work Results for Plumbing."

BB. Install sleeve seals for piping penetrations of concrete walls and slabs.

1. Comply with requirements for sleeve seals specified in Section 220500 "Common Work Results for Plumbing."

CC. Install escutcheons for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for escutcheons specified in Section 220500 "Common Work Results for Plumbing."

3.4 JOINT CONSTRUCTION

A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Hub-and-Spigot, Cast-Iron Soil Piping Caulked Joints: Join in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum caulked joints.

C. Hubless, Cast-Iron Soil Piping Coupled Joints:

1. Join hubless, cast-iron soil piping in accordance with CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1.

1. Cut threads full and clean using sharp dies.
2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
c. Do not use pipe sections that have cracked or open welds.

E. Join stainless-steel pipe and fittings with gaskets in accordance with ASME A112.3.1.

F. Join copper tube and fittings with soldered joints in accordance with ASTM B828. Use ASTM B813, water-flushable, lead-free flux and ASTM B32, lead-free-alloy solder.

G. Grooved Joints: Cut groove ends of pipe in accordance with AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

H. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

I. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings in accordance with the following:

1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join in accordance with ASTM D2235 and ASTM D2661 appendixes.
3. PVC Piping: Join in accordance with ASTM D2855 and ASTM D2665 appendixes.

J. Joint Restraints and Sway Bracing:

1. Provide joint restraints and sway bracing for storm drainage piping joints to comply with the following conditions:

   a. Provide axial restraint for pipe and fittings 5 inches and larger, upstream and downstream of all changes in direction, branches, and changes in diameter greater than two pipe sizes.
   b. Provide rigid sway bracing for pipe and fittings 4 inches and larger, upstream and downstream of all changes in direction 45 degrees and greater.
   c. Provide rigid sway bracing for pipe and fittings 5 inches and larger, upstream and downstream of all changes in direction and branch openings.

3.5 INSTALLATION OF VALVES

A. General valve installation requirements for general-duty valve installation are specified in Section 220523 "General-Duty Valves for Plumbing Piping."

B. Shutoff Valves:

1. Install shutoff valve on each sewage pump discharge.
2. Install gate valve for piping NPS 2 and smaller.
3. Install gate valve for piping NPS 2-1/2 and larger.

C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.

D. Backwater Valves: Install backwater valves in piping subject to backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
2. Floor Drains: Drain outlet backwater valves unless drain has integral backwater valve.
3. Install backwater valves in accessible locations.
4. Comply with requirements for backwater valve specified in Section 221319 "Sanitary Waste Piping Specialties."

3.6 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for seismic-restraint devices.

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment".

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42 clamps.
6. Install individual, straight, horizontal piping runs:

   a. 100 Ft. and Less: MSS Type 1, adjustable, steel clevis hangers.

b. Longer Than 100 Ft.: MSS Type 43, adjustable roller hangers.
c. Longer Than 100 Ft. if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Ft. or Longer: MSS Type 44 pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52 spring hangers.

C. Install hangers for cast-iron, steel, stainless steel and copper soil piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58 and the requirements of the NYC Building Code, whichever are most stringent.

D. Install hangers for ABS and PVC piping, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions and the requirements of the NYC Building Code, whichever are most stringent.

E. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

F. Support vertical runs of cast-iron, steel, stainless steel and copper soil piping to comply with MSS SP-58, locally enforced codes, and the requirements of the NYC Building Code, whichever are most stringent.

G. Support vertical runs of ABS and PVC piping to comply with manufacturer's written instructions, and the requirements of the NYC Building Code, whichever are most stringent.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect waste and vent piping to the following:

1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by NYC Plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by the NYC Plumbing Code.
3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by NYC Plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Install horizontal backwater valves with cleanout cover flush with floor.
6. Comply with requirements for backwater valves, cleanouts and drains specified in Section 221319 "Sanitary Waste Piping Specialties."
7. Equipment: Connect waste piping as indicated.

a. Provide shutoff valve if indicated and union for each connection.
b. Use flanges instead of unions for connections NPS 2-1/2 and larger.

D. Connect force-main piping to the following:

1. Sanitary Sewer: To exterior force main.

2. Sewage Pump: To sewage pump discharge.

E. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

F. Make connections in accordance with the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.8 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping.

B. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.9 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect sanitary waste and vent piping during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed Plastic Piping: Protect ABS plumbing vents exposed to sunlight with two coats of water-based latex paint.

E. Repair damage to adjacent materials caused by waste and vent piping installation.

END OF SECTION 221316

SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Cleanouts.
2. Air-admittance valves.
3. Miscellaneous sanitary drainage piping specialties.

B. Related Requirements:

1. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashing assemblies.
2. Section 077200 "Roof Accessories" for preformed flashings.
3. Section 078413 "Penetration Firestopping" for through-penetration firestop assemblies.
4. Section 221423 "Storm Drainage Piping Specialties" for trench drains for storm water, channel drainage systems for storm water, roof drains, and catch basins.
5. Section 334200 "Stormwater Conveyance" for storm drainage piping and piping specialties outside the building.

1.3 DEFINITIONS

A. ABS: Acrylonitrile butadiene styrene.

B. PVC: Polyvinyl chloride.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Show fabrication and installation details for frost-resistant vent terminals.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sanitary waste piping specialties to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Cast-Iron Exposed Cleanouts :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Jay R. Smith Mfg Co; a division of Morris Group International.
   b. Josam Company.
   c. MIFAB, Inc.
   d. Tyler Pipe; a subsidiary of McWane Inc.
   e. Zurn Industries, LLC.
   f. Or approved equal.

2. Standard: ASME A112.36.2M.
3. Size: Same as connected drainage piping
4. Body Material: Hub-and-spigot, cast-iron soil pipe T-branch as required to match connected piping.
5. Closure: Countersunk, cast-iron plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Cast-Iron Exposed Floor Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Jay R. Smith Mfg Co; a division of Morris Group International.
   b. Josam Company.
   c. Sioux Chief Manufacturing Company, Inc.
   d. WATTS.
   e. Zurn Industries, LLC.
   f. Or approved equal.

2. Standard: ASME A112.36.2M for heavy-duty, adjustable housing cleanout.
3. Size: Same as connected branch.

4. Type: Heavy-duty, adjustable housing.
5. Body or Ferrule: Cast iron.

2.2 AIR-ADMITTANCE VALVES

A. Fixture Air-Admittance Valves:

1. Standard: ASSE 1051, Type A for single fixture or Type B for branch piping.
2. Housing: Plastic.
3. Operation: Mechanical sealing diaphragm.
4. Size: Same as connected fixture or branch vent piping.

2.3 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Air-Gap Fittings:

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
2. Body: Bronze or cast iron.
3. Inlet: Opening in top of body.
4. Outlet: Larger than inlet.
5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

B. Stack Flashing Fittings:

1. Description: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
2. Size: Same as connected stack vent or vent stack.

C. Vent Caps :

1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
2. Size: Same as connected stack vent or vent stack.

D. Frost-Resistant Vent Terminals:

1. Description: Manufactured or shop-fabricated assembly constructed of copper, lead-coated copper, or galvanized steel.
2. Design: To provide 1-inch enclosed air space between outside of pipe and inside of flashing collar extension, with counterflashing.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

D. Install fixture air-admittance valves on fixture drain piping.

E. Install stack air-admittance valves at top of stack vent and vent stack piping.

F. Install air-admittance-valve wall boxes recessed in wall.

G. Assemble open drain fittings and install with top of hub 2 inches above floor.

H. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

I. Install sleeve and sleeve seals with each riser and stack passing through floors with waterproof membrane.

J. Install vent caps on each vent pipe passing through roof.

K. Install frost-resistant vent terminals on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.

L. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.

M. Install wood-blocking reinforcement for wall-mounting-type specialties.

N. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.3 PIPING CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment, to allow service and maintenance.

3.4 LABELING AND IDENTIFYING

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.

1. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.5 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319

SECTION 221319.13 - SANITARY DRAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Floor drains.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene styrene.

B. FRP: Fiberglass-reinforced plastic.

C. HDPE: High-density polyethylene.

D. PE: Polyethylene.

E. PP: Polypropylene.

F. PVC: Polyvinyl chloride.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 FLOOR DRAINS

A. Cast-Iron Floor Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Jay R. Smith Mfg. Co.
   b. Josam Company.
   c. MIFAB, Inc.
   d. Prier Products, Inc.
   e. Sioux Chief Manufacturing Company, Inc.
   f. Wade; a subsidiary of McWane Inc.
   g. Zurn Industries, LLC.
   h. Or approved equal.

2. Standard: ASME A112.6.3.
3. Pattern: Floor drain.
4. Body Material: Gray iron.
5. Trap Material: Cast iron.
6. Trap Pattern: Standard P-trap.
7. Trap Features: Trap-seal primer valve drain connection.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage.
3. Set with grates depressed according to the following drainage area:

   a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
   b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
   c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

4. Install floor-drain flashing collar or flange, so no leakage occurs between drain and adjoining flooring.

   a. Maintain integrity of waterproof membranes where penetrated.

5. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

B. Install trench drains at low points of surface areas to be drained.

   1. Set grates of drains flush with finished surface, unless otherwise indicated.

C. Comply with ASME A112.3.1 for installation of stainless-steel channel drainage systems.

   1. Install on support devices, so that top will be flush with adjacent surface.

D. Install FRP channel drainage system components on support devices, so that top will be flush with adjacent surface.

E. Install plastic channel drainage system components on support devices, so that top will be flush with adjacent surface.

F. Install open drain fittings with top of hub 2 inches above floor.

3.3 CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Comply with requirements in Section 221319 "Sanitary Waste Piping Specialties" for backwater valves, air admittance devices and miscellaneous sanitary drainage piping specialties.

C. Install piping adjacent to equipment to allow service and maintenance.

D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 LABELING AND IDENTIFYING

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.5 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319.13

SECTION 221329 - SANITARY SEWERAGE PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Submersible sewage pumps.

B. Related Requirements:

1. Section 221429 "Sump Pumps" for applications in storm-drainage systems.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
4. Include diagrams for power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For pumps and controls, to include in operation and maintenance manuals.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with manufacturer's written instructions for handling.

1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sewage ejector equipment, material and accessories that do not comply with specified requirements.

B. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. UL Compliance: Comply with UL 778 for motor-operated water pumps.

2.2 SUBMERSIBLE SEWAGE PUMPS

A. Submersible, Quick-Disconnect, Double-Seal Sewage Pumps:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. E.I.M. Electric Co., Ltd.
b. Federal Pump Corp.
c. Flygt; a brand of Xylem Inc.
d. HOMA Pump Technology Inc.
e. KSB Inc.
f. Stancor, Inc.
g. Sta-Rite Industries, Inc.; Pentair Ltd.
h. Tsurumi America, Inc.

i. Or approved equal.

2. Description: Factory-assembled and -tested sewage-pump unit with guide-rail supports.
3. Pump type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sewage pump as defined in HI 1.1-1.2 and HI 1.3.
4. Pump Casing: Cast iron, with open inlet, and discharge fittings for connection to guide-rail support.
5. Impeller: Statically and dynamically balanced, stainless steel, nonclog, open, or semiopen design for solids handling, and keyed and secured to shaft.
6. Pump and Motor Shaft: Stainless steel or steel, with factory-sealed, grease-lubricated ball bearings.
7. Seals: Mechanical.
8. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.

   a. Motor Housing Fluid: Oil.

9. Controls, Float- and Pressure-Switch Type:

   a. Enclosure: NEMA 250, Type 1 ; wall mounted.
   b. Switch Type: Mercury-float type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
   c. Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
   d. High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mercury-float switch matching control and electric bell; 120 V ac, with transformer and contacts for remote alarm bell.

10. Control-Interface Features:

    a. Remote Alarm Contacts: For remote alarm interface.
    b. Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:

       1) On-off status of pump.
       2) Alarm status.

11. Guide-Rail Supports:

    a. Standard: SWPA's "Submersible Sewage Pumping Systems (SWPA) Handbook."
    b. Guide Rails: Vertical pipes or structural members, made of galvanized steel or other corrosion-resistant metal, attached to baseplate and basin sidewall or cover.
    c. Baseplate: Corrosion-resistant metal plate, attached to basin floor, supporting guide rails and stationary elbow.
    d. Pump Yoke: Motor- or casing-mounted yokes or other attachments for aligning pump during connection of flanges.
    e. Movable Elbow: Pump discharge-elbow fitting with flange, seal, and positioning device.
    f. Stationary Elbow: Fixed discharge-elbow fitting with flange that mates to movable-elbow flange and support attached to baseplate.
    g. Lifting Cable: Stainless steel; attached to pump and cover at manhole.

B. Capacities and Characteristics:

1. Unit Capacity: 100 .
2. Number of Pumps: Two.Each Pump: 50 gpm

    a. Total Dynamic Head: 21 feet.
    b. Speed: 3365 rpm.
    c. Discharge Pipe Size: 4".
    d. Motor Horsepower: 2 hp.
    e. Electrical Characteristics:

        1) Volts: 480 V ac.
        2) Phases: Three.
        3) Hertz: 60.

2.3 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 220500 "Common Work Results for Plumbing."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

B. Motors for submersible pumps must be hermetically sealed.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EARTHWORK

A. Excavation and filling are specified in Section 312000 "Earth Moving."

3.3 EXAMINATION

A. Examine roughing-in for plumbing piping to verify actual locations of sanitary drainage and vent piping connections before sewage pump installation.

3.4 INSTALLATION

A. Pump Installation Standards:

1. Comply with HI 1.4 for installation of centrifugal pumps.

B. Equipment Mounting:

1. Install progressing-cavity sewage pumps on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

C. Wiring Method: Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.5 CONNECTIONS

A. Comply with requirements for piping specified in Section 221316 "Sanitary Waste and Vent Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to equipment, allow space for service and maintenance.

3.6 FIELD QUALITY CONTROL

A. Pumps and controls will be considered defective if they do not pass tests and inspections.

B. Prepare test and inspection reports.

3.7 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.8 ADJUSTING

A. Adjust pumps to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust control set points.

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate controls and pumps.

END OF SECTION 221329

SECTION 221414 - STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Hub-and-spigot, cast-iron soil pipe and fittings.
2. Hubless, cast-iron soil pipe and fittings.

B. Related Requirements:

1. Section 221429 "Sump Pumps" for storm drainage pumps.
2. Section 334200 "Stormwater Conveyance" for storm drainage piping outside the building.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For controlled-flow roof drainage system. Include calculations, plans, sections, elevations, and details.

D. Coordination Drawings: Plans and elevations, or Building Information Model (BIM) drawn to scale, showing items described in this Section and coordinated with all building trades.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For storm drainage piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certificate is based and their installation requirements.

B. Field Quality-Control Reports: Inspection reports signed by the NYC Department of Buildings inspector.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Provide materials bearing label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Components and installation are to be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water.
2. Storm Drainage, Force-Main Piping: 50 psig.

B. Seismic Performance: Storm drainage piping and support and installation to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully functional after the seismic event."
2. Component Importance Factor: 1.5.

2.2 PIPING MATERIALS

A. Piping materials to bear label, stamp, or other markings of specified testing agency.

B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AB & I Foundry; a part of the McWane family of companies.
2. Charlotte Pipe and Foundry Company.
3. Tyler Pipe; a part of McWane family of companies.
4. Or approved equal.

B. Pipe and Fittings:

1. Marked with CISPI collective trademark and NSF certification mark.
2. Standard: ASTM A74.

C. Gaskets: ASTM C564, rubber.

2.4 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AB & I Foundry; a part of the McWane family of companies.
2. Charlotte Pipe and Foundry Company.
3. Tyler Pipe; a part of McWane family of companies.
4. Or approved equal.

B. Pipe and Fittings:

1. Marked with CISPI collective trademark and NSF certification mark.
2. Standards: ASTM A888 and CISPI 301.

C. Heavy-Duty, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ANACO-Husky.
b. Charlotte Pipe and Foundry Company.
c. MIFAB, Inc.
d. Or approved equal.

2. Standard: ASTM C1277 or ASTM C1540.
3. Description: Stainless steel shield with stainless steel bands and tightening devices; and ASTM C564, rubber sleeve with integral, center pipe stop.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.3 INSTALLATION OF PIPING

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.

B. Install piping as indicated unless deviations from layout are approved on coordination drawings.

C. Install piping in concealed locations.

1. Piping installed in equipment rooms, service areas, and where indicated may be exposed.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Make changes in direction for piping using appropriate branches, bends, and long-sweep bends.

1. Do not change direction of flow more than 90 degrees.
2. Use proper size of standard increasers and reducers if pipes of different sizes are connected.

a. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building piping beginning at low point of each system.

1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
3. Maintain swab in piping and pull past each joint as completed.

M. Install piping at the following minimum slopes unless otherwise indicated.

1. Building Storm Drain: 1/4 inch per foot downward in direction of flow for piping NPS 3 and smaller; 1/8 inch per foot downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Storm Drainage Piping: 1/4 inch per foot downward in direction of flow.

N. Install cast-iron soil piping in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Ch IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping in accordance with ASTM A674 or AWWA C105/A 21.5.

O. Install underground piping in accordance with ASTM D2321.

P. Install engineered controlled-flow drain specialties and storm drainage piping in locations indicated.

1. Install encasement on piping in accordance with ASTM A674 or AWWA C105/A 21.5.

Q. Install force mains at elevations indicated.

R. Plumbing Specialties:

1. Install backwater valves in storm drainage gravity-flow piping.

a. Comply with requirements for backwater valves specified in Section 221423 "Storm Drainage Piping Specialties."

2. Install cleanouts in storm drainage gravity-flow piping in accessible locations.

a. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping.
b. Comply with requirements for cleanouts specified in Section 221423 "Storm Drainage Piping Specialties."

3. Install drains in storm drainage gravity-flow piping.

a. Comply with requirements for drains specified in Section 221423 "Storm Drainage Piping Specialties."

S. Do not enclose, cover, or put piping into operation until it is inspected and approved by the NYC Department of Buildings.

T. Install sleeves for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for sleeves specified in Section 220500 "Common Work Results for Plumbing."

U. Install sleeve seals for piping penetrations of concrete walls and slabs.

1. Comply with requirements for sleeve seals specified in Section 220500 "Common Work Results for Plumbing."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for escutcheons specified in Section 220500 "Common Work Results for Plumbing."

3.4 JOINT CONSTRUCTION

A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Hub-and-Spigot, Cast-Iron Soil Piping Caulked Joints: Join in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum caulked joints.

C. Hubless, Cast-Iron Soil Piping Coupled Joints: Join in accordance with CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1.

1. Cut threads full and clean using sharp dies.
2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

a. Apply appropriate tape or thread compound to external pipe threads unless dry-seal threading is specified.
b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
c. Do not use pipe sections that have cracked or open welds.

E. Grooved Joints: Cut groove ends of pipe in accordance with AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fittings. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

F. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

G. Plastic, Nonpressure-Piping, Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings in accordance with the following:

1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.

H. Joint Restraints and Sway Bracing:

1. Provide joint restraints and sway bracing for storm drainage piping joints to comply with the following conditions:

a. Provide axial restraint for pipe and fittings 5 inches and larger, upstream and downstream of all changes in direction, branches, and changes in diameter greater than two pipe sizes.
b. Provide rigid sway bracing for pipe and fittings 4 inches and larger, upstream and downstream of all changes in direction 45 degrees and greater.
c. Provide rigid sway bracing for pipe and fittings 5 inches and larger, upstream and downstream of all changes in direction and branch openings.

3.5 INSTALLATION OF VALVES

A. General valve installation requirements for general-duty valve installations are specified in Section 220523 "General-Duty Valves for Plumbing Piping."

B. Shutoff Valves:

1. Install shutoff valve on each sump pump discharge.
2. Install gate for piping NS 2 and smaller.
3. Install gate valve for piping NPS 2-1/2 and larger.

C. Check Valves: Install swing-check valve, between pump and shutoff valve, on each sump pump discharge.

D. Backwater Valves: Install backwater valves in piping subject to backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
2. Install backwater valves in accessible locations.
3. Comply with requirements for backwater valves specified in Section 221423 "Storm Drainage Piping Specialties."

3.6 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for hangers, supports, and anchor devices specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Install individual, straight, horizontal piping runs:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install hangers for cast-iron, galvanized-steel and copper soil tubing and piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58, and the requirements of the NYC Building Code whichever are most stringent.

C. Install hangers for ABS and PVC piping, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions and the requirements of the NYC Building Code whichever are most stringent.

D. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.

E. Support vertical cast-iron, galvanized steel and copper, tubing and piping to comply with MSS SP-58, and the requirements of the NYC Building Code, but as a minimum at base and at each floor.

F. Support vertical ABS and PVC piping with manufacturer's written instructions and the requirements of the NYC Building Code.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

C. Connect storm drainage piping to roof drains and storm drainage specialties.

1. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
2. Install horizontal backwater valves with cleanout cover flush with floor, in pit with pit cover flush with floor.
3. Comply with requirements for backwater valves, cleanouts and drains specified in Section 221423 "Storm Drainage Piping Specialties."

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections in accordance with the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.8 IDENTIFICATION

A. Identify exposed storm drainage piping.

B. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.9 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

3.10 PROTECTION

A. Protect piping and drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of day and when work stops.

C. Repair damage to adjacent materials caused by storm drainage piping installation.

END OF SECTION 221414

SECTION 221423 - STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. General-purpose roof drains.
2. Backwater valves.

B. Related Requirements:

1. Section 076200 "Sheet Metal Flashing and Trim" for penetrations of roofs.
2. Section 078413 "Penetration Firestopping" for firestopping roof penetrations.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. General-purpose roof drains.
2. Backwater valves.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Provide drainage piping specialties are to bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 GENERAL-PURPOSE ROOF DRAINS

A. Cast-Iron Roof Drains:

1. Cast-Iron, Large-Sump, General-Purpose Roof Drains:

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Jay R. Smith Mfg Co; a division of Morris Group International.
      2) MIFAB, Inc.
      3) Sioux Chief Manufacturing Company, Inc.
      4) Wade; a subsidiary of McWane Inc.
      5) Zurn Industries, LLC.
      6) Or approved equal.

   b. Standard: ASME A112.6.4.
   c. Body Material: Cast iron.
   d. Dome Material: Cast iron.

2.2 BACKWATER VALVES

A. Cast-Iron Backwater Valves:

1. Cast-Iron, Horizontal Backwater Valves:

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Jay R. Smith Mfg Co; a division of Morris Group International.
      2) Josam Company.
      3) Wade; a subsidiary of McWane Inc.
      4) Watts Water Technologies; a Watts company.
      5) Zurn Industries, LLC.
      6) Or approved equal.

   b. Standard: ASME A112.14.1.
   c. Size: Same as connected piping.
   d. Body Material: Cast iron.
   e. End Connections: Hub and spigot or no-hub.
   f. Extension: ASTM A74, Service Class; full-size, cast-iron soil-pipe extension to field-installed cleanout at floor; replaces backwater valve cover.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install roof drains in accordance with roof membrane manufacturer's written installation instructions at low points of roof areas.

1. Install flashing collar or flange of roof drain to maintain integrity of waterproof membranes where penetrated.
2. Install expansion joints, if indicated, in roof drain outlets.
3. Position roof drains for easy access and maintenance.

B. Install downspout adapters on outlet of back-outlet parapet roof drains and connect to sheet metal downspouts.

C. Install downspout boots at grade with top 18 inches above grade. Secure to building wall.

D. Install downspout nozzles at exposed bottom of conductors where they spill onto grade.

E. Install cleanouts in aboveground piping and building drain piping in accordance with the following instructions unless otherwise indicated:

1. Use cleanouts the same size as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
3. Locate clean-outs at minimum intervals of 50 ft. for piping NPS 4 and smaller and 100 ft. for larger piping.
4. Locate cleanouts at base of each vertical storm piping conductor.

F. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

G. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

H. Install horizontal backwater valves in floor with cover flush with floor.

I. Install test tees in vertical conductors and near floor.

J. Install wall cleanouts in vertical conductors. Install access door in wall if indicated.

K. Assemble channel drainage system components in accordance with manufacturer's written instructions. Install on support devices so that top will be flush with adjacent surface.

L. Install through-penetration firestop assemblies for penetrations of fire- and smoke-rated assemblies.

1. Comply with requirements in Section 078413 "Penetration Firestopping."

3.3 CONNECTIONS

A. Comply with requirements for piping specified in Section 221414 "Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

3.4 INSTALLATION OF FLASHING

A. Fabricate flashing from single piece of metal unless large pans, sumps, or other drainage shapes are required.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

3.5 CLEANING

A. Clean piping specialties during installation and remove dirt and debris as work progresses.

3.6 PROTECTION

A. Protect piping specialties during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of each day and when work stops.

END OF SECTION 221423

SECTION 221429 - SUMP PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Oil-sensing sump pumps and controllers.

B. Related Requirements:

1. Section 221329 "Sanitary Sewerage Pumps" for effluent and sewage pumps.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data Submittals: For each product.

1. Construction details, material descriptions, dimensions of individual components and profiles.
2. Rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For pumps and controls.

1. Indicate actual installed items by marking submittals with an arrow or box.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with manufacturer's written instructions for handling.

1.8 WARRANTY

A. Manufacturer Warranty: Manufacturer agrees to repair or replace sump pumps that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Faulty operation of pump.
b. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of sump pump from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and use.

B. UL Compliance: Comply with UL 778 for motor-operated water pumps.

2.3 OIL-SENSING SUMP PUMPS AND CONTROLLERS

A. Oil-Sensing Sump Pumps and Controllers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Flo Fab Inc.
b. Liberty Pumps.
c. Little Giant; a brand of Franklin Electric Co., Inc.

d. Zoeller Company.
e. Or approved equal.

2. Description: Factory-assembled and -tested sump-pump unit. ASME A17.1 compliant.
3. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sump pump as defined in HI 14.1-14.2 and HI 14.3.
4. Pump Casing: Cast iron, with strainer inlet; legs that elevate pump to permit flow into impeller; and vertical discharge for piping connection.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EARTHWORK

A. Excavation and filling are specified in Section 312000 "Earth Moving."

3.3 EXAMINATION

A. Examine roughing-in for plumbing piping to verify actual locations of storm drainage piping connections before sump-pump installation.

3.4 INSTALLATION

A. Pump Installation Standards: Comply with HI 14.4 for installation of sump pumps.

B. Wiring Method: Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.5 PIPING CONNECTIONS

A. Comply with requirements for piping specified in Section 221414 "Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to equipment, allow space for service and maintenance.

3.6 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform and Perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's written instructions.

3.7 ADJUSTING

A. Adjust pumps to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust control set points.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust, and operate controls and pumps.

END OF SECTION 221429

SECTION 223300 - ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Commercial, electric, storage, domestic-water heaters.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data Submittals: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals:

1. Water Heaters: Product Data for water heater compliance with ASHRAE's "Advanced Energy Design Guides."

C. Shop Drawings:

1. Include diagrams for power, signal, and control wiring.

D. Coordination Drawings: Equipment room drawing or BIM model, drawn to scale, on which the items described in this Section are shown and coordinated with all building trades.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: Certificates, for commercial domestic-water heaters, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Product Certificates: For each type of commercial, electric, domestic-water heater.

C. Domestic-Water Heater Labeling: Certified and labeled by qualified testing agency.

D. Source quality-control reports.

E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric, domestic-water heaters to include emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions, Section 014000 "Quality Requirements."

1.8 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and use.

B. Seismic Performance: Commercial, electric, domestic-water heaters to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Component Importance Factor: 1.5.

C. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1.

D. ASME Compliance: Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

E. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 and NSF 372.

2.2 COMMERCIAL, ELECTRIC, DOMESTIC-WATER HEATERS

A. Commercial, Electric, Storage, Domestic-Water Heaters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. A. O. Smith Corporation.
   b. Bradford White Corporation.
   c. PVI; A WATTS Brand.
   d. Or approved equal.

2. Source Limitations: Obtain domestic-water heaters from single source from single manufacturer.
3. Standard: UL 1453.

4. Factory-Installed, Storage-Tank Appurtenances:

   a. Anode Rod: Replaceable magnesium.
   b. Drain Valve: Corrosion-resistant metal with hose-end connection.
   c. Insulation: Comply with ASHRAE/IES 90.1.
   d. Jacket: Steel with enameled finish or high-impact composite material.
   e. Heating Elements: Electric, screw-in or bolt-on immersion type arranged in multiples of three.
   f. Temperature Control: Adjustable thermostat.
   g. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
   h. Relief Valves: ASME rated and stamped for combination temperature-and-pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of domestic-water heater. Select one relief valve with sensing element that extends into storage tank.

5. Special Requirements: NSF 5 construction.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, in accordance with ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test commercial domestic-water heaters to minimum of one and one-half times pressure rating before shipment.

C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Electric, Domestic-Water Heater Mounting: Install commercial, electric, domestic-water heaters on concrete base. Comply with requirements for concrete bases specified in Section 033000 "Cast-in-Place Concrete."

1. Exception: Omit concrete bases for commercial, electric, domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
2. Maintain manufacturer's recommended clearances.
3. Arrange units so controls and devices that require servicing are accessible.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Install anchor bolts to elevations required for proper attachment to supported equipment.
8. Anchor domestic-water heaters to substrate.

B. Install anchor bolts to elevations required for proper attachment to supported equipment.

C. Anchor domestic-water heaters to substrate.

D. Electric, Tankless, Domestic-Water Heater Mounting: Install electric, tankless, domestic-water heaters at least 18 inches above floor on wall bracket.

1. Maintain manufacturer's recommended clearances.
2. Arrange units so controls and devices that require servicing are accessible.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Anchor domestic-water heaters to substrate.

E. Install electric, domestic-water heaters level and plumb, in accordance with layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping.

F. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend domestic-water heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

G. Install combination temperature-and-pressure relief valves in water piping for electric, domestic-water heaters without storage. Extend domestic-water heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

H. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 221119 "Domestic Water Piping Specialties."

I. Install thermometers on outlet piping of electric, domestic-water heaters. Comply with requirements for thermometers specified in Section 220500 "Common Work Results for Plumbing."

J. Install thermometers on inlet and outlet piping of solar, electric, domestic-water heaters. Comply with requirements for thermometers specified in Section 220500 "Common Work Results for Plumbing."

K. Assemble and install inlet and outlet piping manifold kits for multiple electric, domestic-water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each electric, domestic-water heater. Include shutoff valve and thermometer in each domestic-water heater inlet and outlet, and throttling valve in each electric, domestic-water heater outlet. Comply with requirements for valves specified in Section 220523 "General-Duty Valves for Plumbing Piping" and comply with requirements for thermometers specified in Section 220500 "Common Work Results for Plumbing."

L. Install pressure-reducing valve with integral bypass relief valve in electric, domestic-water booster-heater inlet piping and water hammer arrester in booster-heater outlet piping. Set pressure-reducing valve for outlet pressure of 25 psig. Comply with requirements for pressure-reducing valves and water hammer arresters specified in Section 221119 "Domestic Water Piping Specialties."

M. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.

N. Fill electric, domestic-water heaters with water.

O. Charge domestic-water expansion tanks with air to required system pressure.

P. Install dielectric fittings in all locations where piping of dissimilar metals is to be joined. The wetted surface of the dielectric fitting contacted by potable water to contain less than 0.25 percent of lead by weight.

3.3 PIPING CONNECTIONS

A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.4 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections with the assistance of a factory-authorized service representative.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust, and operate, commercial, electric, domestic-water heaters. Instruction to be a minimum of two hours.

END OF SECTION 223300

SECTION 224200 - COMMERCIAL PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Commercial lavatories.
2. Commercial showers.
3. Commercial sinks.
4. Commercial urinals.
5. Commercial water closets.
6. Toilet seats.
7. Fixture carriers.

1.3 DEFINITIONS

A. FRP: Fiberglass-reinforced plastic.

B. PMMA: Polymethyl methacrylate; also known as "acrylic."

C. Standard-Efficiency Flush Volume: 1.6 gal. per flush.

D. High-Efficiency Flush Volume: 1.28 gal. or less per flush.

E. WaterSense Fixture: Water closet and/or flushometer valve/tank certified by the EPA to meet the WaterSense performance criteria.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Shop Drawings:

1. Plans, elevations, sections, and mounting attachment details.

2. Details of equipment assemblies, including accessories. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection, location and size of each cutout, and anchorage provisions and attachment methods. Indicate coordination requirements for adjacent and interfacing Work.
3. Diagrams for power, signal, and control wiring.

B. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories and/or counter-mounted sinks.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. For lavatories and faucets.

a. In addition to DDC General Conditions requirements, include the following:

1) Servicing and adjustments of automatic faucets.

2. For shower valves to include in maintenance manuals
3. For sinks and faucets to include in operation and maintenance manuals.

a. In addition to DDC General Conditions requirements, include the following:

1) Servicing and adjustments of automatic faucets.

4. For flushometer valves and electronic sensors to include in operation and maintenance manuals.
5. For wash fountains and components to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Lavatory faucets, sink faucets, shower valves, and wash fountain spray heads and faucets intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA) and with NSF 61 and NSF 372, or be certified in compliance with NSF 61 and NSF 372 by an ANSI-accredited third-party certification body, in that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 COMMERCIAL LAVATORIES

A. Lavatories, Counter Mounted:

1. Lavatories, Counter Mounted - Enameled Cast Iron, Flat Rim, Flush Mount:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Commercial Enameling Company.
2) Kohler Co.
3) American Standard.
4) Or approved equal.

b. Faucet: Lavatory Faucets, Automatically Operated.

2.3 COMMERCIAL SHOWERS

A. Showers, Individual:

1. Showers, Individual - FRP, One Piece without Top:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Florestone Products Co., Inc.
2) American Standard.
3) Kohler Co.
4) Or approved equal.

b. Source Limitations: Obtain FRP showers without top from single source from single manufacturer.
c. Description: FRP shower enclosure with valve and receptor and appurtenances.
d. Standard: CSA B45.5/IAPMO Z124.
e. Shower Head and Shower Valve.
f. Color: White.
g. Outlet: Drain with NPS 2 outlet.

2.4 COMMERCIAL SINKS

A. Service Sinks, Floor Mounted:

1. Service Sinks, Floor Mounted - Terrazzo:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Acorn Engineering Company; a Division of Morris Group International.
2) Fiat Products.

3) Florestone Products Co., Inc.
4) Stern-Williams Products, LLC.
5) Or approved equal.

b. Source Limitations: Obtain sinks from single source from single manufacturer.

c. Mounting: On floor and flush to wall.
d. Faucet.

2.5 COMMERCIAL URINALS

A. Urinals, Wall Hung:

1. Urinals, Wall Hung - Bottom Outlet, Washout:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) American Standard.
2) ProFlo; a Ferguson Enterprises, Inc. brand.
3) Kohler Co.
4) Or approved equal.

b. Flushometer Valve.

c. Support: Urinal carrier, floor affixed with steel uprights and bearing plates.

2.6 COMMERCIAL WATER CLOSETS

A. Water Closets, Wall Mounted:

1. Water Closets, Wall Mounted - Top Spud:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) American Standard.
2) Kohler Co.
3) TOTO USA, INC.
4) Or approved equal.

b. Source Limitations: Obtain water closets from single source from single manufacturer.
c. Standard: ASME A112.19.2/CSA B45.1.
d. Bowl:

1) Material: Vitreous china.
2) Type: Siphon jet.
3) Style: Flushometer valve.
4) Mounting Height: Standard.
5) Rim Contour: Elongated.

6) Water Consumption: 1.28 gal. per flush.
7) Spud Size and Location: NPS 1-1/2; top.
8) Color: White.

e. Flushometer Valve.
f. Toilet Seat.
g. Support: Water-closet carrier, floor affixed.

2.7 TOILET SEATS

A. Toilet Seats - Commercial :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Standard.
b. Kohler Co.
c. TOTO USA, INC.
d. Or approved equal.

2. Source Limitations: Obtain toilet seat from single source from single manufacturer.
3. Standard: IAPMO/ANSI Z124.5.
4. Material: Plastic.
5. Type: Commercial heavy duty.
6. Shape: Elongated rim, open front.
7. Hinge: Check.
8. Hinge Material: Noncorroding metal.
9. Seat Cover: Not required.
10. Color: White.
11. Surface Treatment: Not required.

2.8 FIXTURE CARRIERS

A. Fixture Carriers - Lavatory:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Jay R. Smith Mfg Co; a division of Morris Group International.
b. WATTS; A Watts Water Technologies Company.
c. Zurn Industries, LLC.
d. Or approved equal.

2. Source Limitations: Obtain lavatory carriers from single source from single manufacturer.
3. Standards:

a. ASME A112.6.1M.
b. ASME A112.6.2.

B. Fixture Carriers - Urinal:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Jay R. Smith Mfg Co; a division of Morris Group International.
b. WATTS; A Watts Water Technologies Company.
c. Zurn Industries, LLC.
d. Or approved equal.

2. Source Limitations: Obtain urinal carriers from single source from single manufacturer.
3. Standard: ASME A112.6.1M.
4. Description: Waste-fitting assembly, as required to match drainage piping material and arrangement with faceplates, couplings, gaskets, and feet; bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

C. Fixture Carriers - Water Closet :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Jay R. Smith Mfg Co; a division of Morris Group International.
b. WATTS; A Watts Water Technologies Company.
c. Zurn Industries, LLC.
d. Or approved equal.

2. Source Limitations: Obtain water closet carriers from single source from single manufacturer.
3. Standard: ASME A112.6.1M.
4. Description: Waste-fitting assembly, as required to match drainage piping material and arrangement with faceplates, couplings, gaskets, and feet; bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine roughing-in of water-supply piping and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.

B. Examine walls and floors for suitable conditions where plumbing fixtures will be installed.

C. Examine counters for suitable conditions where lavatories and sinks will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF COMMERCIAL PLUMBING FIXTURES

A. Lavatory Installation:

1. Install lavatories level and plumb in accordance with roughing-in drawings.

2. Install supports, affixed to building substrate, for wall-mounted lavatories.
3. Install accessible, wall-mounted lavatories at mounting height in accordance with ICC A117.1-2009.
4. Install water-supply piping with stop on each supply to each lavatory faucet. Install stops in locations that are accessible for ease of operation.
5. Install trap and waste piping on each drain outlet of each lavatory to be connected to sanitary drainage system.
6. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220500 "Common Work Results for Plumbing."
7. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."
8. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

B. Shower Installation:

1. Assemble shower components in accordance with manufacturers' written instructions.
2. Install showers level and plumb in accordance with roughing-in drawings.
3. Install ball or gate valves in water-supply piping to the shower if supply stops are specified with the shower valve. Comply with ball or gate valve requirements specified in Section 220523 "General Duty Valves for Plumbing Piping." Install valves in locations that are accessible for ease of operation.
4. Install shower flow-control fittings with specified maximum flow rates in shower arms.
5. Set shower receptors and shower basins in leveling bed of cement grout.
6. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220500 "Common Work Results for Plumbing."

C. Sink Installation:

1. Install sinks level and plumb in accordance with roughing-in drawings.
2. Install supports, affixed to building substrate, for wall-mounted sinks.
3. Install accessible, wall-mounted sinks at mounting height in accordance with ICC A117.1-2009.
4. Set floor-mounted sinks in leveling bed of cement grout.
5. Install water-supply piping with stop on each supply to each sink faucet.

    a. Exception: Use ball or gate valves if supply stops are not specified with sink. Comply with valve requirements specified in Section 220523 "General Duty Valves for Plumbing Piping."
    b. Install stops/valves in locations that are accessible for ease of operation.

6. Install trap and waste piping on each drain outlet of each sink to be connected to sanitary drainage system.
7. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220500 "Common Work Results for Plumbing."
8. Seal joints between sinks, counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."
9. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

D. Urinal Installation:

1. Install urinals level and plumb in accordance with roughing-in drawings.
2. Install wall-hung, back-outlet urinals onto waste-fitting seals and attached to supports.
3. Install wall-hung, bottom-outlet urinals with tubular waste piping attached to supports.
4. Install accessible, wall-mounted urinals at mounting height in accordance with ICC A117.1-2009.
5. Install trap-seal liquid in waterless urinals.
6. Install supports, affixed to building substrate, for wall-hung urinals.
7. Use off-floor carriers with waste fitting and seal for back-outlet urinals.
8. Use carriers without waste fitting for urinals with tubular waste piping.
9. Use chair-type carrier supports with rectangular steel uprights for accessible urinals.
10. Measure support height installation from finished floor, not structural floor.
11. Install flushometer-valve, water-supply fitting on each supply to each urinal.
12. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
13. Install lever-handle flushometer valves for accessible urinals with handle mounted on open side of compartment.
14. Install actuators in locations easily reachable for people with disabilities.
15. Install new batteries in battery-powered, electronic-sensor mechanisms.
16. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Install deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220500 "Common Work Results for Plumbing."
17. Seal joints between urinals, walls, and floors using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to urinal color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

E. Water Closet Installation:

1. Install water closets level and plumb in accordance with roughing-in drawings.
2. Install accessible, wall-mounted water closets at mounting height in accordance with ICC A117.1-2009.
3. Install supports, affixed to building substrate, for floor-mounted, back-outlet water closets.
4. Use carrier supports with waste-fitting assembly and seal.
5. Install floor-mounted, back-outlet water closets, attached to building floor substrate, onto waste-fitting seals; and attach to support.
6. Install wall-mounted, back-outlet water-closet supports with waste-fitting assembly and waste-fitting seals, and affix to building substrate.
7. Measure support height installation from finished floor, not structural floor.
8. Install flushometer-valve, water-supply fitting on each supply to each water closet.
9. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
10. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.
11. Install actuators in locations easily reachable for people with disabilities.
12. Install new batteries in battery-powered, electronic-sensor mechanisms.
13. Install toilet seats on water closets.
14. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Install deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220500 "Common Work Results for Plumbing."

3.4 INSTALLATION OF PIPING CONNECTIONS

A. Connect plumbing fixtures with water supplies and soil, waste, and vent piping. Use size fittings required to match plumbing fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil, waste, and vent piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Install protective-shielding pipe covers and enclosures on exposed supplies and waste piping of accessible plumbing fixtures. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

E. Where installing piping adjacent to water closets and urinals, allow space for service and maintenance.

3.5 INSTALLATION OF ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted in accordance with NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate to be laminated acrylic or melamine plastic signs.
2. Nameplate to be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.6 INSTALLATION OF CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring.

3.7 ADJUSTING

A. Operate and adjust plumbing fixtures and controls. Replace damaged and malfunctioning plumbing fixtures, fittings, and controls.

B. Adjust water pressure at all faucets to produce proper flow.

C. Adjust water pressure at shower valves to produce proper flow.

D. Adjust water pressure at flushometer valves to produce proper flow.

E. Install new batteries in battery-powered, electronic-sensor mechanisms.

3.8 CLEANING AND PROTECTION

A. After completing installation of plumbing fixtures, inspect and repair damage to finishes. Replace any fixtures unable to be repaired to the satisfaction of the Commissioner.

B. Clean plumbing fixtures and associated faucets, valves, flushometer valves, and fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed plumbing fixtures and associated faucets, valves, flushometer valves, and fittings.

D. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Commissioner.

END OF SECTION 224200

SECTION 224713 - DRINKING FOUNTAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Bottle filling stations.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include operating characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals:

1. Plumbing Fixtures: Provide the following:

a. Manufacturer cut sheet indicating water consumption.
b. WaterSense certification for residential fixtures, commercial water closets, commercial urinals, and commercial showers.

C. Shop Drawings:

1. Include diagrams for power wiring.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Standards:

1. Drinking fountains and bottle filling stations intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), requirements of the NYC Plumbing Code, and with NSF 61 or NSF 372, or be certified in compliance with NSF 61 or NSF 372 by an ANSI-accredited third-party certification body, that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.
2. Comply with ASME A112.19.3/CSA B45.4 for stainless steel drinking fountains and bottle filling stations.
3. Comply with ASME A112.19.2/CSA B45.1 for vitreous china drinking fountains.
4. Comply with NSF 42 and NSF 53 for water filters for drinking fountains and bottle filling stations.
5. Comply with 2009 ICC A117.1, for accessible drinking fountains and bottle filling stations.

2.2 BOTTLE FILLING STATIONS

A. Bottle Filling Station - Surface Wall-Mounted, Stainless Steel:

1. Basis-of-Design Product: Subject to compliance with requirements, provide drinking fountain as shown in drawings as manufactured by Haws or comparable product by one of the following:

   a. Elkay.
   b. Filtrine.
   c. Or approved equal.

2. Source Limitations: Obtain surface wall-mounted, stainless steel, bottle filling stations from single source from single manufacturer.
3. Type: Vandal resistant.
4. Cabinet: Stainless steel.
5. Bottle Filler: Sensor activation, with 20-second automatic shutoff timer. Fill rate 0.5 to 1.5 gpm.
6. Drain: Grid type with NPS 1-1/4 tailpiece.
7. Supply: NPS 3/8 with shutoff valve.
8. Waste Fitting: ASME A112.18.2/CSA B125.2, NPS 1-1/4 brass P-trap.
9. Filter: One or more water filters complying with NSF 42 and NSF 53 and with capacity sized for peak flow rate.
10. Support: Provide manufacturer's mounting plate and drinking fountain carrier.
11. Electrical Characteristics:

    a. Volts: 120 V ac.
    b. Phase: Single.
    c. Hertz: 60 Hz.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.

B. Examine walls and floors for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by 2022 NYC Building Code..

B. Set pedestal drinking fountains and bottle filling stations on flat surface in accordance with manufacturer's written installation instructions.

C. Install recessed, drinking fountains and bottle filling stations secured to wood blocking in wall construction.

D. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.

E. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball or gate valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Section 220523 "General-Duty Valves for Plumbing Piping."

F. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

G. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220500 "Common Work Results for Plumbing."

H. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.4 PIPING CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Install ball or gate shutoff valve on water supply to each fixture. Install valve upstream from filter for drinking fountain. Comply with valve requirements specified in Section 220523 "General-Duty Valves for Plumbing Piping."

D. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.5 ELECTRICAL CONNECTIONS

A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

B. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

C. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplates to be laminated acrylic or melamine plastic signs.
2. Nameplates to be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.6 ADJUSTING

A. Adjust fixture flow regulators for proper flow and stream height.

3.7 CLEANING

A. After installing fixtures, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

C. Provide protective covering for installed fixtures.

D. Do not allow use of fixtures for temporary facilities unless approved in writing by Commissioner.

END OF SECTION 224713

SECTION 230500 - COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Sleeves without waterstop.
2. Escutcheons.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. For each type of product, excluding motors which are included in Part 1 of HVAC equipment Sections.

   a. Include construction details, material descriptions, and dimensions of individual components, and finishes.

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 SLEEVES AND SLEEVE SEALS

A. Sleeves without Waterstop:

1. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron, with plain ends.
2. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, hot-dip galvanized, with plain ends.

2.2 ESCUTCHEONS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. BrassCraft Manufacturing Co.; a Masco company.
2. Dearborn Brass.
3. Keeney Manufacturing Company (The).
4. Or approved equal.

B. Escutcheon Types:

1. One-Piece, Steel Type: With polished, chrome-plated finish and setscrew fastener.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF SLEEVES - GENERAL

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout or silicone sealant, seal space outside of sleeves in floors/slabs/walls without sleeve-seal system. Select to maintain fire resistance of floor/slab/wall.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.

2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants that joint sealant manufacturer's literature indicates is appropriate for size, depth, and location of joint.

E. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke-Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

3.3 SLEEVES APPLICATION

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Interior Walls and Partitions:

a. Sleeves without waterstops.

3.4 ESCUTCHEONS APPLICATION

A. Escutcheons for New Piping and Relocated Existing Piping:

1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
2. Insulated Piping:

a. One piece, steel with polished, chrome-plated finish.

3. Bare Piping at Wall and Floor Penetrations in Finished Spaces:

a. One piece, steel with polished, chrome-plated finish.

4. Bare Piping at Ceiling Penetrations in Finished Spaces:

a. One piece, steel with polished, chrome-plated finish.

B. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping and Relocated Existing Piping: Split floor plate.

END OF SECTION 230500

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Equipment stands.
6. Equipment supports.

B. Related Requirements:

1. Section 230500 "Common Work Results for HVAC" for pipe guides and anchors.
2. Section 233113 "Metal Ducts" for duct hangers and supports.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Equipment supports.

1.5 QUALITY ASSURANCE

A. Refer to DDC Geneal Conditions Section 014000 "Quality Requirements."

B. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for HVAC piping and equipment must withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized, hot-dip galvanized, or electro-galvanized.
3. Nonmetallic Coatings: Plastic coated, or epoxy powder-coated.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe and Tube Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-plated steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-plated steel stainless steel.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cooper B-line; brand of Eaton, Electrical Sector.

b. Flex-Strut Inc.
c. Unistrut; Part of Atkore International.
d. Or approved equal.

2. Description: Shop- or field-fabricated, pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
4. Channels: Continuous slotted galvanized steel stainless steel, Type 304 stainless steel, Type 316 extruded-aluminum channel with inturned lips.
5. Channel Width: Selected for applicable load criteria.
6. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
7. Hanger Rods: Continuous-thread rod, nuts, and washer made of galvanized steel.

2.5 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Buckaroos, Inc.
2. Pipe Shields Inc.
3. Rilco Manufacturing Co., Inc.
4. Or approved equal.

B. Insulation for Cold Piping: ASTM C552, Type II cellular glass with 100-psi minimum compressive strength and vapor barrier.

C. Insulation for Hot Piping: Water-repellent-treated, ASTM C533, Type I calcium silicate with 100-psi minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield must cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield must cover lower 180 degrees of pipe.

2.6 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.7 OUTDOOR EQUIPMENT STANDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. MIRO Industries.
2. RectorSeal HVAC; a CSW Industrials Company.
3. Quicksling..
4. Or approved equal.

B. Description: Individual foot supports with elevated adjustable channel cross bars and clamps/fasteners/bolts for ground or roof supported outdoor equipment components, without roof membrane penetration, in a pre-fabricated system that can be modularly-assembled on site.

1. Foot Material: Rubber or polypropylene.
2. Rails Material: Hot dip galvanized carbon steel.

2.8 MATERIALS

A. Aluminum: ASTM B221.

B. Carbon Steel: ASTM A1011/A1011M.

C. Structural Steel: ASTM A36/A36M, carbon-steel plates, shapes, and bars; galvanized.

D. Stainless Steel: ASTM A240/A240M.

E. Threaded Rods: Continuously threaded. Zinc-plated or galvanized steel for indoor applications and stainless steel for outdoor applications. Mating nuts and washers of similar materials as rods.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 APPLICATION

A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.

3.3 INSTALLATION OF HANGERS AND SUPPORTS

A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A36/A36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Framing System Installation: Metal Arrange for grouping of parallel runs of piping, and support together on field-assembled strut systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Install lateral bracing with pipe hangers and supports to prevent swaying.

I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

K. Insulated Piping:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

3.4 INSTALLATION OF EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Provide lateral bracing, to prevent swaying, for equipment supports.

3.5 METAL FABRICATIONS

A. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

B. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.6 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.7 PAINTING

A. Comply with requirements in Section 099123 "Interior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780/A780M.

3.8 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports metal trapeze pipe hangers and metal framing systemsand attachments for general service applications.

F. Use copper-plated pipe hangers and copper or stainless steel attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
3. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.

4. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.

J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

K. Comply with MSS SP-58 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

L. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

END OF SECTION 230529

SECTION 230548.13 - VIBRATION CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Elastomeric isolation pads.
2. Open-spring isolators.
3. Elastomeric hangers.
4. Spring hangers.
5. Post-installed concrete anchors.
6. Concrete inserts.
7. Vibration isolation equipment bases.
8. Restrained isolation roof-curb rails.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device component.
3. Annotate to indicate application of each product submitted and compliance with requirements.

B. Shop Drawings:

1. Detail fabrication and assembly of equipment bases.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 ELASTOMERIC ISOLATION PADS

A. Elastomeric Isolation Pads: .

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Kinetics Noise Control, Inc.
   b. Mason Industries, Inc.
   c. Vibration Management Corp.
   d. Or approved equal.

2. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
3. Size: Factory or field cut to match requirements of supported equipment.
4. Pad Material: Oil- and water-resistant rubber.

2.2 OPEN-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators: .

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Kinetics Noise Control, Inc.
   b. Mason Industries, Inc.
   c. Vibration Management Corp.
   d. Or approved equal.

2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates must limit floor load to 500 psi.
7. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

2.3 HOUSED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators in Two-Part Telescoping Housing: .

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Kinetics Noise Control, Inc.
    b. Mason Industries, Inc.
    c. Vibration Management Corp.
    d. Or approved equal.

2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Minimum deflection as indicated on Drawings.
7. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators.

    a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases must limit floor load to 500 psi.
    b. Top housing with threaded mounting holes and internal leveling device.

2.4 ELASTOMERIC HANGERS

A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods: .

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Kinetics Noise Control, Inc.
    b. Mason Industries, Inc.
    c. Vibration Management Corp.
    d. Or approved equal.

2. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
3. Damping Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel-to-steel contact.

2.5 SPRING HANGERS

A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression: .

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Kinetics Noise Control, Inc.
    b. Mason Industries, Inc.
    c. Vibration Management Corp.
    d. Or approved equal.

2. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
7. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.

2.6 POST-INSTALLED CONCRETE ANCHORS

A. Mechanical Anchor Bolts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hilti, Inc.
   b. Mason Industries, Inc.
   c. Simpson Strong-Tie Co., Inc.
   d. Or approved equal.

2.7 VIBRATION ISOLATION EQUIPMENT BASES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CADDY; a brand of nVent.
2. California Dynamics Corporation.
3. Kinetics Noise Control, Inc.
4. Mason Industries, Inc.
5. Novia; A Division of C&P.
6. Vibration Eliminator Co., Inc.
7. Vibration Isolation.
8. Vibration Management Corp.
9. Vibration Mountings & Controls, Inc.
10. Or approved equal.

B. Steel Rails: Factory-fabricated, welded, structural-steel rails.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide rails.
2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A36/A36M. Rails must have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

C. Steel Bases: Factory-fabricated, welded, structural-steel bases and rails.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A36/A36M. Bases must have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

2.8 RESTRAINED ISOLATION ROOF-CURB RAILS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CADDY; a brand of nVent.
2. California Dynamics Corporation.
3. Kinetics Noise Control, Inc.
4. Novia; A Division of C&P.
5. Thybar Corporation.
6. Vibration Eliminator Co., Inc.
7. Vibration Management Corp.
8. Vibration Mountings & Controls, Inc.
9. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an evaluation service member of ICC-ES.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength is adequate to carry static and wind force loads within specified loading limits.

3.4 INSTALLATION OF VIBRATION CONTROL DEVICES

A. Provide vibration control devices for systems and equipment where indicated in Equipment Schedules or Vibration-Control Device Schedules on Drawings, where Specifications indicate they are to be installed on specific equipment and systems, and where required by applicable codes.

B. Coordinate location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete."

C. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

D. Comply with requirements in Section 077200 "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.

E. Equipment Restraints:

1. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.

F. Piping Restraints:

1. Comply with requirements in MSS SP-127.

G. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

H. Post-Installed Concrete Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the Commissioner if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge-Type Anchor Bolts: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors must be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior and stainless steel anchors for exterior applications.

3.5 ACCOMMODATION OF DIFFERENTIAL MOTION

A. Provide flexible connections in piping systems where they cross structural joints and other point where differential movement may occur. Provide adequate flexibility to accommodate differential movement as determined in accordance with ASCE/SEI 7.

3.6 |INSTALLATION OF VIBRATION ISOLATION EQUIPMENT BASES

A. Coordinate location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate dimensions of equipment bases with requirements of isolated equipment specified in this and other Sections. Where dimensions of base are indicated on Drawings, they may require adjustment to accommodate isolated equipment.

3.7 ADJUSTING

A. Adjust isolators after system is at operating weight.

B. Adjust limit stops on restrained-spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Measure isolator restraint clearance.
2. Measure isolator deflection.

C. Remove and replace malfunctioning units and retest as specified above.

D. Prepare test and inspection reports.

END OF SECTION 230548.13

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Pipe labels.
3. Duct labels.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Brady Corporation.
   b. Carlton Industries, LP.
   c. Craftmark Pipe Markers.
   d. Or approved equal

2. Material and Thickness: stainless steel, 0.025-inch aluminum, 0.032-inch minimum thickness, with predrilled or stamped holes for attachment hardware.

3. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
4. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
5. Fasteners: Stainless steel rivets or self-tapping screws.
6. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Brady Corporation.
   b. Carlton Industries, LP.
   c. Craftmark Pipe Markers.
   d. Or approved equal.

2. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, with predrilled holes for attachment hardware.
3. Letter and Background Color: As indicated for specific application under Part 3.
4. Maximum Temperature: Able to withstand temperatures of up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

2.2 PIPE LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Actioncraft Products, Inc.; a division of Industrial Test Equipment Co., Inc.
2. Brady Corporation.
3. Brimar Industries, Inc.
4. emedco.
5. Kolbi Pipe Marker Co.
6. LEM Products Inc.
7. Marking Services Inc.
8. Or approved equal.

B. General Requirements for Manufactured Pipe Labels: Preprinted, color coded, with lettering indicating service and showing flow direction in accordance with ASME A13.1.

C. Letter and Background Color: As indicated for specific application under Part 3.

D. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

E. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

F. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings. Also include:

1. Pipe size.
2. Flow-Direction Arrows: Include flow-direction arrows on main distribution piping. Arrows may be either integral with label or applied separately.
3. Lettering Size: At least 1/2 inch for viewing distances of up to 72 inches and proportionately larger lettering for greater viewing distances.

2.3 DUCT LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Carlton Industries, LP.
3. Craftmark Pipe Markers.
4. Or approved equal.

B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

C. Letter and Background Color: As indicated for specific application under Part 3.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances of up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings. Also include the following:

1. Duct size.
2. Flow-Direction Arrows: Include flow-direction arrows on main distribution ducts. Arrows may be either integral with label or may be applied separately.
3. Lettering Size: At least 1/2 inch for viewing distances of up to 72 inches and proportionately larger lettering for greater viewing distances.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.3 INSTALLATION, GENERAL REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

D. Locate identifying devices so that they are readily visible from the point of normal approach.

3.4 INSTALLATION OF EQUIPMENT LABELS, WARNING SIGNS, AND LABELS

A. Permanently fasten labels on each item of mechanical equipment.

B. Sign and Label Colors:

1. White letters on an ANSI Z535.1 safety-blue background.

C. Locate equipment labels where accessible and visible.

3.5 INSTALLATION OF PIPE LABELS

A. Install pipe labels showing service and flow direction with permanent adhesive on pipes.

B. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Within 3 ft. of each valve and control device.
2. At access doors, manholes, and similar access points that permit view of concealed piping.
3. Within 3 ft. of equipment items and other points of origination and termination.
4. Spaced at maximum intervals of 25 ft. along each run. Reduce intervals to 10 ft. in areas of congested piping, ductwork, and equipment.

C. Do not apply plastic pipe labels or plastic tapes directly to bare pipes conveying fluids at temperatures of 125 deg F or higher. Where these pipes are to remain uninsulated, use a short section of insulation or use stenciled labels.

D. Flow-Direction Arrows: Use arrows to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

E. Pipe-Label Color Schedule:

1. Refrigerant Piping: White letters on an ANSI Z535.1 safety-blue background.
2. Potable and Other Water: White letters on an ANSI Z535.1 safety-green background.

3.6 INSTALLATION OF DUCT LABELS

A. Install plastic-laminated duct labels showing service and flow direction with permanent adhesive on air ducts.

1. Provide labels in the following color codes:

a. For air supply ducts: White letters on blue background.
b. For air return ducts: White letters on blue background.
c. For exhaust-, outside-, relief-, return-, and mixed-air ducts: White letters on blue background.

B. Locate label near each point where ducts enter into and exit from concealed spaces and at maximum intervals of 20 ft. where exposed or are concealed by removable ceiling system.

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

   a. Constant-volume air systems.
   b. Variable-air-volume systems.
   c. Multizone systems.

2. Testing, adjusting, and balancing existing systems and equipment.
3. Duct leakage tests.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. BAS: Building automation systems.

C. NEBB: National Environmental Balancing Bureau.

D. TAB: Testing, adjusting, and balancing.

E. TABB: Testing, Adjusting, and Balancing Bureau.

F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

G. TDH: Total dynamic head.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. TAB Specialists Qualifications: Certified by AABC.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

L. Examine operating safety interlocks and controls on HVAC equipment.

M. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 PREPARATION

A. Prepare a TAB plan that includes the following:

1. Equipment and systems to be tested.
2. Strategies and step-by-step procedures for balancing the systems.
3. Instrumentation to be used.
4. Sample forms with specific identification for all equipment.

B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:

a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
b. Duct systems are complete with terminals installed.
c. Volume, smoke, and fire dampers are open and functional.
d. Clean filters are installed.
e. Fans are operating, free of vibration, and rotating in correct direction.
f. Variable-frequency controllers' startup is complete and safeties are verified.
g. Automatic temperature-control systems are operational.
h. Ceilings are installed.
i. Windows and doors are installed.
j. Suitable access to balancing devices and equipment is provided.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," and Section 230719 "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.6 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
b. Where duct conditions allow, measure airflow by main Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses, close to the fan and prior to any outlets, to obtain total airflow.
c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.

2. Measure fan static pressures as follows:

    a. Measure static pressure directly at the fan outlet or through the flexible connection.
    b. Measure static pressure directly at the fan inlet or through the flexible connection.
    c. Measure static pressure across each component that makes up the air-handling system.
    d. Report artificial loading of filters at the time static pressures are measured.

3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
4. Obtain approval from Commissioner for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.

1. Measure airflow of submain and branch ducts.
2. Adjust submain and branch duct volume dampers for specified airflow.
3. Re-measure each submain and branch duct after all have been adjusted.

C. Adjust air inlets and outlets for each space to indicated airflows.

1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
2. Measure inlets and outlets airflow.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after they have been adjusted.

D. Verify final system conditions.

1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
2. Re-measure and confirm that total airflow is within design.
3. Re-measure all final fan operating data, rpms, volts, amps, and static profile.
4. Mark all final settings.
5. Test system in economizer mode. Verify proper operation and adjust if necessary.
6. Measure and record all operating data.
7. Record final fan-performance data.

3.7 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Adjust the variable-air-volume systems as follows:

1. Verify that the system static pressure sensor is located two-thirds of the distance down the duct from the fan discharge.
2. Verify that the system is under static pressure control.

3. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure, and adjust system static pressure control set point so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
4. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows:

    a. Adjust controls so that terminal is calling for maximum airflow. Some controllers require starting with minimum airflow. Verify calibration procedure for specific project.
    b. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor.
    c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
    d. Adjust controls so that terminal is calling for minimum airflow.
    e. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. If no minimum calibration is available, note any deviation from design airflow.
    f. When in full cooling or full heating, ensure that there is no mixing of hot-deck and cold-deck airstreams unless so designed.
    g. On constant volume terminals, in critical areas where room pressure is to be maintained, verify that the airflow remains constant over the full range of full cooling to full heating. Note any deviation from design airflow or room pressure.

5. After terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.

    a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
    b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflow so that connected total matches fan selection and simulates actual load in the building.
    c. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
    d. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
    e. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

6. Measure fan static pressures as follows:

    a. Measure static pressure directly at the fan outlet or through the flexible connection.
    b. Measure static pressure directly at the fan inlet or through the flexible connection.
    c. Measure static pressure across each component that makes up the air-handling system.
    d. Report any artificial loading of filters at the time static pressures are measured.

7. Set final return and outside airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

    a. Balance the return-air ducts and inlets the same as described for constant-volume air systems.
    b. Verify that terminal units are meeting design airflow under system maximum flow.

8. Re-measure the inlet static pressure at the most critical terminal unit and adjust the system static pressure set point to the most energy-efficient set point to maintain the optimum system static pressure. Record set point and give to controls subcontractor.
9. Verify final system conditions as follows:

    a. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
    b. Re-measure and confirm that total airflow is within design.
    c. Re-measure final fan operating data, rpms, volts, amps, and static profile.
    d. Mark final settings.
    e. Test system in economizer mode. Verify proper operation and adjust if necessary. Measure and record all operating data.
    f. Verify tracking between supply and return fans.

3.8 PROCEDURES FOR MULTIZONE SYSTEMS

A. Position the unit's automatic zone dampers for maximum flow through the cooling coil.

B. The procedures for multizone systems will utilize the zone balancing dampers to achieve the indicated airflow within the zone.

C. After balancing, place the unit's automatic zone dampers for maximum heating flow. Retest zone airflows and record any variances.

D. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

    a. Set outside-air, return-air and relief-air dampers for proper position that simulates minimum outdoor air conditions.
    b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
    c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
    d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

2. Measure fan static pressures as follows:

    a. Measure static pressure directly at the fan outlet or through the flexible connection.
    b. Measure static pressure directly at the fan inlet or through the flexible connection.
    c. Measure static pressure across each component that makes up the air-handling system.
    d. Report artificial loading of filters at the time static pressures are measured.

3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.

4. Obtain approval from Commissioner for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

E. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.

1. Measure airflow of submain and branch ducts.
2. Adjust submain and branch duct volume dampers for specified airflow.
3. Re-measure each submain and branch duct after all have been adjusted.

F. Adjust air inlets and outlets for each space to indicated airflows.

1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
2. Measure inlets and outlets airflow.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after they have been adjusted.

G. Verify final system conditions.

1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
2. Re-measure and confirm that total airflow is within design.
3. Re-measure all final fan operating data, rpms, volts, amps, and static profile.
4. Mark all final settings.
5. Test system in economizer mode. Verify proper operation and adjust if necessary.
6. Measure and record all operating data.
7. Record final fan-performance data.

3.9 DUCT LEAKAGE TESTS

A. Witness the duct pressure testing performed by Installer.

B. Verify that proper test methods are used and that leakage rates are within specified tolerances.

C. Report deficiencies observed.

3.10 TOLERANCES

A. Set HVAC system's airflow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.

B. Maintaining pressure relationships as designed must have priority over the tolerances specified above.

3.11 PROGRESS REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems balancing devices. Recommend changes and additions to systems balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

3.12 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer, retained by the Contractor.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Contractor's name and address.
6. Report date.
7. Signature of TAB supervisor who certifies the report.
8. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
9. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

10. Nomenclature sheets for each item of equipment.
11. Data for terminal units, including manufacturer's name, type, size, and fittings.
12. Notes to explain why certain final data in the body of reports vary from indicated values.
13. Test conditions for fans and pump performance forms including the following:

a. Settings for outdoor-, return-, and exhaust-air dampers.
b. Conditions of filters.
c. Cooling coil, wet- and dry-bulb conditions.
d. Face and bypass damper settings at coils.
e. Fan drive settings including settings and percentage of maximum pitch diameter.
f. Inlet vane settings for variable-air-volume systems.
g. Settings for supply-air, static-pressure controller.
h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Duct, outlet, and inlet sizes.
3. Pipe and valve sizes and locations.
4. Terminal units.
5. Balancing stations.
6. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Unit arrangement and class.
g. Discharge arrangement.
h. Sheave make, size in inches, and bore.
i. Center-to-center dimensions of sheave and amount of adjustments in inches.
j. Number, make, and size of belts.
k. Number, type, and size of filters.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave and amount of adjustments in inches.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.

e. Filter static-pressure differential in inches wg.
f. Outdoor airflow in cfm.
g. Return airflow in cfm.
h. Outdoor-air damper position.
i. Return-air damper position.

F. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Coil identification.
d. Capacity in Btu/h.
e. Number of stages.
f. Connected volts, phase, and hertz.
g. Rated amperage.
h. Airflow rate in cfm.

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm.
b. Voltage at each connection.
c. Amperage for each phase.

G. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.
h. Center-to-center dimensions of sheave and amount of adjustments in inches.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

H. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft..
g. Indicated airflow rate in cfm.
h. Indicated velocity in fpm.
i. Actual airflow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

I. Air-Terminal-Device Reports:

1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft..

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm.
b. Air velocity in fpm.
c. Preliminary airflow rate as needed in cfm.
d. Preliminary velocity as needed in fpm.
e. Final airflow rate in cfm.
f. Final velocity in fpm.
g. Space temperature in deg F.

J. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.13 VERIFICATION OF TAB REPORT

A. TAB specialist must conduct the inspection in the presence of Commissioner.

B. Commissioner must randomly select measurements, documented in the final report, to be rechecked. Rechecking must be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.

C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements must be noted as "FAILED."

D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing must be considered incomplete and must be rejected.

E. If TAB work fails, proceed as follows:

1. TAB specialists must recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.

F. Prepare test and inspection reports.

3.14 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230713 - DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes insulating the following duct services:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
6. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
7. Outdoor, exposed supply and return.

B. Related Requirements:

1. Section 230719 "HVAC Piping Insulation."
2. Section 233113 "Metal Ducts" for duct liners.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers are to be marked with the manufacturer's name, appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84, by a qualified testing agency. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.

1. All Insulation Installed Indoors and Outdoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2.2 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General" and "Indoor Duct and Plenum Insulation Schedule" articles for where insulating materials are to be applied.

B. Products do not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Insulation materials for use on austenitic stainless steel are qualified as acceptable in accordance with ASTM C795.

E. Foam insulation materials do not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric: Closed-cell or expanded-rubber materials; suitable for maximum use temperature between minus 70 deg F and 220 deg F. Comply with ASTM C534, Type II for sheet materials.

G. Glass-Fiber Blanket: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 450 deg F in accordance with ASTM C411. Comply with ASTM C553, Type II, and ASTM C1290, . Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

H. Glass-Fiber Board Insulation: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature between 35 deg F and 250 deg F for jacketed and between 35 deg F and 450 deg F for unfaced in accordance with ASTM C411. Comply with ASTM C612, Type IA or Type IB. For duct and plenum applications, provide insulation . Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.3 ADHESIVES

A. Materials are compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Aeroflex USA.
   b. Armacell LLC.
   c. K-Flex USA.
   d. Or approved equal.

2. Adhesives must have a VOC content of 50 g/L or less.
3. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Glass-Fiber and Mineral Wool Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Fiberglass adhesive must have a VOC content of 80 g/L or less when calculated in accordance with 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Adhesive must have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Adhesive must have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.4 MASTICS AND COATINGS

A. Materials are compatible with insulation materials, jackets, and substrates.

1. VOC Content: 300 g/L or less.
2. Low-Emitting Materials: Mastic coatings must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Materials are compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: Aluminum.
5. Sealant must have a VOC content of 420 g/L or less.
6. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:

1. Materials are compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: White.
5. Sealant must have a VOC content of 420 g/L or less.
6. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.6 FIELD-APPLIED JACKETS

A. Field-applied jackets comply with ASTM C921, Type I, unless otherwise indicated.

2.7 SECUREMENTS

A. Bands:

1. Stainless Steel: ASTM A240/A240M, Type 304 or Type 316; 0.015 inch thick.
2. Aluminum: ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, compress, or otherwise damage insulation or jacket .

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with Contract Documents, unless otherwise approved by the Commissioner.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth, but not to the extent of creating wrinkles or areas of compression in the insulation.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.

    a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.5 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
2. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
2. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

1. Comply with requirements in Section 078413 "Penetration Firestopping."

E. Insulation Installation at Floor Penetrations:

1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC AND POLYOLEFIN INSULATION

A. Comply with manufacturer's written installation instructions and ASTM C1710.

B. Square and Rectangular Ducts and Plenums:

1. Provide 1/4 inch more per side for a tight, compression fit.
2. Cut sheet insulation with the following dimensions:

   a. Height of duct plus 1/4 inch, plus thickness of insulation, two pieces.

3. Insulate the bottom of the duct with the sheet from (a) above, then the sides with the two sheets from (b) above, and finally the top of the duct with the sheet from (c) above.
4. Insulation without self-adhering backing:

   a. Apply 100 percent coverage of manufacturer adhesive on the metal surface, then the insulation, except for the last 1/4 inch where sheets will butt together.
   b. Roll sheet down into position.
   c. Press two sheets together under compression and apply adhesive at the butt joint to seal the two sheets together.

5. Insulation with self-adhering backing:

   a. Peel back release paper in 6- to 8-inch increments and line up sheet.
   b. Press firmly to activate adhesive.
   c. Align material and continue to line up correctly, pressing firmly while slowly removing release paper.
   d. Allow 1/4-inch overlap for compression at butt joints.
   e. Apply adhesive at the butt joint to seal the two sheets together.

6. Insulate duct brackets following manufacturer's written installation instructions.

C. Circular Ducts:

1. Determine the circumference of the duct, using a strip of insulation the same thickness as to be used.

2. Cut the sheet to the required size.
3. Apply 100 percent coverage of manufacturer adhesive on the metal surface then the insulation.
4. Apply manufacturer adhesive to the cut surfaces along 100 percent of the longitudinal seam. Press together the seam at the ends and then the middle. Close the entire seam starting from the middle.

3.7 INSTALLATION OF GLASS-FIBER AND MINERAL-WOOL INSULATION

A. Comply with manufacturer's written installation instructions.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Impale insulation over pins and attach speed washers.
    f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.8 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

3.9 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Do not field paint aluminum or stainless-steel jackets.

3.10 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in unconditioned space.
4. Indoor, exposed return located in unconditioned space.
5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
6. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
7. Outdoor, exposed supply and return.

B. Items Not Insulated:

1. Fibrous-glass ducts.
2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums and casings.
5. Flexible connectors.
6. Vibration-control devices.
7. Factory-insulated access panels and doors.

3.11 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Refer to plans for required insulation R-values. Thicknesses and densities below may need to be increased to account for varying thermal performance. Overall R-value is the driving factor.

B. Concealed, rectangular, supply-air duct insulation is one of the following:

1. Flexible Elastomeric: 1 inch thick.
2. Glass-Fiber Blanket: 2 inches thick and 1.5 lb/cu. ft. nominal density.
3. Glass-Fiber Board: 2 inches thick and 3 lb/cu. ft. nominal density.

C. Concealed, rectangular, return-air duct insulation is one of the following:

1. Flexible Elastomeric: 1 inch thick.
2. Glass-Fiber Blanket: 2 inches thick and 1.5 lb/cu. ft. nominal density.
3. Glass-Fiber Board: 2 inches thick and 3 lb/cu. ft. nominal density.

D. Concealed, rectangular, outdoor-air duct insulation is one of the following:

1. Flexible Elastomeric: 1 inch thick.
2. Glass-Fiber Blanket: 2 inches thick and 1.5 lb/cu. ft. nominal density.
3. Glass-Fiber Board: 2 inches thick and 3 lb/cu. ft. nominal density.

E. Concealed, rectangular, exhaust-air duct insulation between isolation damper and penetration of building exterior is one of the following:

1. Flexible Elastomeric: 1 inch thick.
2. Glass-Fiber Blanket: 2 inches thick and 1.5 lb/cu. ft. nominal density.
3. Glass-Fiber Board: 2 inches thick and 3 lb/cu. ft. nominal density.

F. Exposed, rectangular, supply-air duct insulation is one of the following:

1. Flexible Elastomeric: 1 inch thick.
2. Glass-Fiber Blanket: 2 inches thick and 1.5 lb/cu. ft. nominal density.
3. Glass-Fiber Board: 2 inches thick and 3 lb/cu. ft. nominal density.

G. Exposed, rectangular, return-air duct insulation is one of the following:

1. Flexible Elastomeric: 1 inch thick.
2. Glass-Fiber Blanket: 2 inches thick and 1.5 lb/cu. ft. nominal density.
3. Glass-Fiber Board: 2 inches thick and 3 lb/cu. ft. nominal density.

H. Exposed, rectangular, outdoor-air duct insulation is one of the following:

1. Flexible Elastomeric: 1 inch thick.
2. Glass-Fiber Blanket: 2 inches thick and 1.5 lb/cu. ft. nominal density.
3. Glass-Fiber Board: 2 inches thick and 3 lb/cu. ft. nominal density.

I. Exposed, rectangular, exhaust-air duct insulation is one of the following:

1. Flexible Elastomeric: 1 inch thick.
2. Glass-Fiber Blanket: 2 inches thick and 1.5 lb/cu. ft. nominal density.
3. Glass-Fiber Board: 2 inches thick and 3 lb/cu. ft. nominal density.

J. Exposed, supply-air plenum insulation is one of the following:

1. Flexible Elastomeric: 1 inch thick.
2. Glass-Fiber Blanket: 2 inches thick and 1.5 lb/cu. ft. nominal density.
3. Glass-Fiber Board: 2 inches thick and 3 lb/cu. ft. nominal density.

K. Exposed, return-air plenum insulation is one of the following:

1. Flexible Elastomeric: 1 inch thick.
2. Glass-Fiber Blanket: 2 inches thick and 1.5 lb/cu. ft. nominal density.
3. Glass-Fiber Board: 2 inches thick and 3 lb/cu. ft. nominal density.

3.12 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Ducts and Plenums, Concealed:

1. Aluminum, Smooth: 0.024 inch thick.

D. Ducts and Plenums, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches:

1. Aluminum, Smooth: 0.024 inch thick.

END OF SECTION 230713

SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes insulation for HVAC piping systems.

B. Related Requirements:

1. Section 230713 "Duct Insulation" for duct insulation.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied, if any).

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation system materials are to be delivered to the Project site in unopened containers. The packaging is to include name of manufacturer, fabricator, type, description, and size.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84 by a testing agency. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.

1. All Insulation Installed Indoors and Outdoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2.2 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and articles for where insulating materials are applied.

B. Products do not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come into contact with stainless steel have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Insulation materials for use on austenitic stainless steel are qualified as acceptable in accordance with ASTM C795.

E. Foam insulation materials do not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric: Closed-cell, or expanded-rubber materials; suitable for maximum use temperature between minus 70 deg F and 220 deg F. Comply with ASTM C534/C534M, Type I, for tubular materials, Type II for sheet materials.

G. Glass-Fiber, Pipe and Tank: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature between 35 deg F and 850 deg F, in accordance with ASTM C411. Comply with ASTM C1393.

1. Semirigid board material with factory-applied ASJ jacket.
2. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

H. Mineral Wool, Pipe and Tank: Mineral wool fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 1000 deg F, in accordance with ASTM C411. Comply with ASTM C1393.

1. Semirigid board material with factory-applied ASJ jacket.

2. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.3 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C1136, Type I.
2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II.

2.4 FIELD-APPLIED JACKETS

A. Field-applied jackets comply with ASTM C1136, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Adhesive: As recommended by jacket material manufacturer.
2. Color: White.
3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.5 TAPES

A. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Width: 2 inches.
2. Thickness: 6 mils.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature of between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system, as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, compress, or otherwise damage insulation or jacket.

D. Install insulation with longitudinal seams at top and bottom (12 o'clock and 6 o'clock positions) of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with the Contract Documents, unless otherwise approved by the Commissioner.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.
3. Install insert materials and insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth, but not to the extent of creating wrinkles or areas of compression in the insulation.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 2 inches o.c.
4. For below-ambient services, apply vapor-barrier mastic over staples.
5. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.
6. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

3.5 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
2. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
2. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

E. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.

3.6 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials, except where more specific requirements are specified in various pipe insulation material installation articles below.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, Mechanical Couplings, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, mechanical couplings, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using prefabricated fitting insulationormitered or routed fittings made from same material and density as that of adjacent pipe insulation. Each piece is butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with prefabricated fitting insulationorsectional pipe insulation of same material and thickness as that used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using prefabricated fitting insulationorsectional pipe insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using prefabricated fitting insulationorsectional pipe insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers, so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges, mechanical couplings, and unions using a section of oversized preformed pipe insulation to fit. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Stencil or label the outside insulation jacket of each union with the word "union" matching size and color of pipe labels.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket, except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing, using PVC tape.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.7 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as that of pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install sections of pipe insulation and miter if required in accordance with manufacturer's written instructions.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated valve covers manufactured of same material as that of pipe insulation when available.
2. When prefabricated valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 INSTALLATION OF GLASS-FIBER AND MINERAL WOOL INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available.
2. When prefabricated sections are not available, install fabricated sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.9 INSTALLATION OF FIELD-APPLIED JACKETS

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

B. Where PVC jackets are indicated and for horizontal applications, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.10 FINISHES

A. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

B. Color: Final color as selected by Commissioner. Vary first and second coats to allow visual inspection of the completed Work.

C. Do not field paint aluminum or stainless steel jackets.

3.11 PIPING INSULATION SCHEDULE, GENERAL

A. Insulation conductivity and thickness per pipe size comply with schedules in this Section or with requirements of the NYC Energy Code, whichever is more stringent.

B. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

3.12 INDOOR PIPING INSULATION SCHEDULE

A. Refer to plans for required insulation R-values. Thicknesses and densities below may need to be increased to account for varying thermal performance. Overall R-value is the driving factor.

B. Condensate and Equipment Drain Water below 60 Deg F:

1. All Pipe Sizes: Insulation is one of the following:

a. Flexible Elastomeric: 1 inch thick.
b. Glass-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
c. Mineral Wool, Preformed Pipe Insulation, Type II: 1 inch thick.

C. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation is the following:

a. Flexible Elastomeric: 2 inches thick.

D. Refrigerant Suction and Hot-Gas Flexible Tubing:

1. All Pipe Sizes: Insulation is the following:

a. Flexible Elastomeric: 2 inches thick.

E. Refrigerant Liquid Piping:

1. All Pipe Sizes: Insulation is the following:

a. Flexible Elastomeric: 2inches thick.

3.13 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation is the following:

   a. Flexible Elastomeric: 2 inches thick.

B. Refrigerant Suction and Hot-Gas Flexible Tubing:

1. All Pipe Sizes: Insulation is the following:

   a. Flexible Elastomeric: 2 inches thick.

C. Refrigerant Liquid Piping:

1. All Pipe Sizes: Insulation is the following:

   a. Flexible Elastomeric: 2 inches thick.

3.14 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

3.15 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

END OF SECTION 230719

SECTION 230800 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes Cx process requirements for the following HVAC systems, assemblies, and equipment:

1. Central-station air-handling systems.
2. Air duct systems.
3. Hydronic distribution systems.
4. Refrigerant piping.
5. Heating and cooling terminal and unitary equipment.
6. HVAC controls and instrumentation.
7. TAB verification.
8. Mechanical insulation.

B. Related Requirements:

1. DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for general Cx process and testing requirements, and CxA responsibilities.
2. For Construction Checklists, comply with requirements in various Division 23 Sections specifying HVAC systems, system components, equipment, and products.

1.3 DEFINITIONS

A. BAS: Building automation system.

B. Cx: Commissioning, as defined in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems."

C. CxA: Commissioning Agent (Aka Commissioning Authority), as defined in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems."

1. The CxA directs and coordinates the commissioning activities and reports to the Commissioner. All members in the construction process work together to fulfill their contracted responsibilities and meet the objectives of the Owner's Project Requirement's as detailed in the Contract Documents.

D. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they mean "as-built" systems, assemblies, subsystems, equipment, and components.

E. TAB: Testing, adjusting, and balancing.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 INFORMATIONAL SUBMITTALS

A. Construction Checklists:

1. Draft Cx plan, including draft Construction Checklists to be prepared by CxA under DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems." Div. 23 Subcontractor is to review Construction Checklist in accordance with requirements in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" and ASHRAE 202 and to resolve any issues with the CxA.

B. Test Equipment and Instruments: For all test equipment and instruments to be used in conducting Cx tests by Div. 23 Subcontractor, provide the following:

1. Equipment/instrument identification number.
2. Planned Cx application or use.
3. Manufacturer, make, model, and serial number.
4. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.
5. Equipment manufacturers' instrumentation and tools. For each instrument or tool, identify the following:

a. Instrument or tool identification number.
b. Equipment schedule designation of equipment for which the instrument or tool is required.
c. Manufacturer, make, model, and serial number.
d. Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.

1.6 CLOSEOUT SUBMITTALS

A. Provide operation and maintenance manuals complying with requirements of DDC General Conditions Section 017839 "Contract Record Documents" and Section 019113 "General Commissioning Requirements for MEP Systems".

B. Refer to Section 230923 "Direct Digital Control (DDC) System for HVAC" for operation and maintenance manual requirements pertaining to Direct Digital Control systems for HVAC.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Testing Equipment and Instrumentation Quality and Calibration:

1. Capable of testing and measuring performance within the specified acceptance criteria.

2. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
3. Be maintained in good repair and operating condition throughout duration of use on Project.
4. Be recalibrated/repaired if dropped or damaged in any way since last calibrated at no additional cost to City of New York.

C. Test Instrumentation and Tools:

1. Equipment Manufacturer's Instrumentation and Tools: For installed equipment included in the Cx process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, must comply with the following:

   a. Be calibrated by manufacturer with current calibration tags permanently affixed.
   b. Include a separate list of proprietary test instrumentation and tools in operation and maintenance manuals.

2. HVAC test instrumentation and tools become property of the City of New York at the time of Substantial Completion.

1.8 COORDINATION

A. Refer to "Coordination" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for coordination requirements including the following:

1. Commissioning Kick-Off and other required meetings.
2. Construction Documents distribution to CxA.
3. Testing Coordination.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 Cx PROCESS:

A. Perform Cx process in accordance with DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for BAS and HVAC and in accordance with the following:

1. New York City Energy Conservation Code.
2. ASHRAE 202.

3.3 CONTRACTOR'S RESPONSIBILITIES

A. In addition to the Contractor's responsibilities indicated in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" the Contractor is responsible for the following:

1. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance test requirements specified in Division 23 Sections specifying HVAC systems and equipment.
2. Attend construction phase controls coordination meetings and ensure that the HVAC and controls Subcontractors attend.
3. Attend testing, adjusting, and balancing review and coordination meetings and ensure that the HVAC Subcontractor and TAB Specialist attend.
4. Prepare preliminary schedule for mechanical system orientations and inspections, operation and maintenance manual submissions, orientation sessions, pipe and duct system testing, flushing and cleaning, equipment start-up, testing and balancing and task completion for the City of New York.
5. Distribute preliminary schedule to commissioning team members at the beginning of the construction phase.

B. TAB Specialist, under the direction of the Contractor to undertake the following:

1. Attend initial commissioning coordination meeting scheduled by the CxA.
2. Submit the site-specific testing and balancing plan to the CxA and Commissioner for review and acceptance.
3. Attend the testing and balancing review meeting scheduled by the CxA. Discuss the procedures for testing, adjusting, and balancing the HVAC system.
4. At the completion of the testing and balancing work, and the submittal of the final testing and balancing report, notify the HVAC Subcontractor and the Contractor.
5. Participate in verification of the testing and balancing report, which will consist of repeating measurements contained in the testing and balancing reports. Assist in diagnostic purposes.
6. Provide recommended setpoints as determined by testing, adjusting, and balancing (TAB), such as static pressure and differential pressure setpoints.

C. The Contractor to provide written notification to the Commissioner and CxA that the following work has been completed in accordance with the Contract Documents, and that the equipment, systems, and sub-systems are operating as designed.

1. HVAC equipment including all fans, air handling units, ductwork, dampers, terminals, and all other equipment furnished in Division 23 specification sections.
2. Fire stopping in the fire rated construction, including fire and smoke damper installation furnished in Division 07 specification sections.
3. Fire detection and smoke detection devices furnished in Division 28 specification sections.

3.4 CONSTRUCTION CHECKLISTS

A. Preliminary detailed Construction Checklists are to be prepared under Section 019113 "General Commissioning Requirements" for MEP Systems for each BAS and HVAC system, assembly, subsystem, equipment, and component required to be commissioned, as detailed in ASHRAE 202. Contractor performs the following:

1. Review BAS and HVAC preliminary Construction Checklists and provide written comments on checklist items where appropriate.
2. Return preliminary Construction Checklist with review comments within 10 days of receipt.
3. When review comments have been resolved, the CxA will provide final Construction Checklists marked "Approved for Use, (date)."
4. Use only Construction Checklists marked "Approved for Use, (date)" When performing tests. Mark Construction Checklists in the appropriate place as indicated Project events are completed, and provide pertinent details and other information.

B. Systems Required to Be Commissioned:

1. Air-handling systems, including the following:

   a. Supply, return, and exhaust air fans, motors, and drives.
   b. Automatic and gravity dampers.
   c. Heating and cooling devices.
   d. Humidification and dehumidification devices.
   e. Air filters.
   f. Hangers and supports.
   g. Interlock between air-handling system and fire/smoke alarm system.

2. Air duct systems, including the following:

   a. Duct systems.
   b. Air-duct accessories, including volume dampers, fire and smoke dampers, turning vanes, sound attenuators, and flexible connectors.
   c. Duct-mounted access doors and panels.
   d. Hangers and supports.

3. hydronic distribution systems, including the following:

   a. Steam distribution piping systems.
   b. Condensate piping systems, including condensate pumps and all accessories.
   c. Hydronic piping systems and all accessories.
   d. Pumps and all accessories.
   e. Sleeves and sleeve seals.
   f. Meters and gauges.
   g. General-duty and specialty valves.
   h. Hangers and supports
   i. Heat tracing.

4. Refrigerant piping, including the following:

   a. Refrigerant piping, fittings, and specialties.
   b. Refrigerant charge.
   c. Sleeves and sleeve seals.
   d. Meters and gauges.
   e. General-duty and specialty valves.
   f. Hangers and supports.

5. Heating and cooling terminal and unitary equipment, including the following:

    a. Unit ventilators.
    b. Unit heaters.
    c. Fan-coil units.
    d. Finned-tube radiation.
    e. Electric heating.
    f. Unitary heating and cooling equipment.
6. Controls and instrumentation, including the following:

    a. Energy monitoring and recording system.
    b. Controllers and sensors.
    c. Automatic control valves, dampers, and actuators.
    d. Control interface with fans, pumps, dampers, and other equipment and systems.
    e. Demand-control systems.

7. TAB Verification:

    a. Airflow.
    b. Water flow.
    c. Space pressurization.

8. Mechanical insulation, including the following:

    a. Duct and plenum insulation.
    b. HVAC piping insulation.

3.5 Cx TESTING PREPARATION

A. Refer to "Testing Procedures" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for preparation requirements prior to Functional Testing.

3.6 HVAC TESTING REQUIREMENTS

A. In addition to the requirements in the "General Testing Requirements" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems", provide the following:

1. Include entire HVAC installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing must include measuring capacities and effectiveness of operational and control functions.
2. Prepare detailed testing plans, procedures, and checklists for HVAC systems, subsystems, and equipment in conjunction with the CxA. Contractor to ensure the participation of the HVAC Subcontractor, HVAC Controls Subcontractor and the TAB Specialist as needed for this work.
3. If tests cannot be completed because of a deficiency outside the scope of the HVAC system, document the deficiency and report it to the Commissioner. After deficiencies are resolved, reschedule tests.

3.7 Cx TEST CONDITIONS

A. Refer to "General Testing Requirements" Article, and "Testing Procedures" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for satisfying Cx requirements related to testing.

3.8 HVAC SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in individual Division 23 sections. Provide submittals, test data, inspector record, and certifications to the CxA.

3.9 Cx TESTS COMMON TO HVAC SYSTEMS

A. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions, to verify compliance with acceptance criteria.

B. Test systems, assemblies, subsystems, equipment, and components for operating modes, interlocks, control responses, responses to abnormal or emergency conditions, and response in accordance with acceptance criteria.

C. Coordinate schedule with, and perform Cx activities under the direction of CxA.

D. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance test requirements specified in Division 23 sections specifying HVAC systems and equipment.

E. Provide technicians, instrumentation, tools, and equipment to perform and document the following:

1. Cx Construction Checklist verification tests.
2. Cx Construction Checklist verification test demonstrations.

3.10 TAB VERIFICATION

A. Prerequisites: Completion of "Examination" Article requirements and correction of deficiencies, as specified in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

B. Completion of "Preparation" Article requirements for preparation of a TAB plan that includes strategies and step-by-step procedures, and system-readiness checks and reports, as specified in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

C. Scope: HVAC air systems and hydronic piping systems.

D. Purpose: Differential flow relationships intended to maintain air and water pressurization differentials between the various areas of Project.

E. Prior to performance of Testing, Adjusting and Balancing (TAB) work, provide copies of reports, sample forms, checklists, and certificates to the CxA.

F. Notify the CxA at least ten (10) days in advance of testing and balancing Work and provide access for the CxA to witness testing and balancing Work.

G. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC systems at the direction of the CxA.

1. The CxA will notify the Contractor ten (10) days in advance of the date of field verification. Notice will not include data points to be verified.
2. Ensure that the TAB specialist uses the same instruments (by model and serial number) that were used when original data were collected.
3. Failure of an item includes, other than sound, a deviation of more than 10 percent. Failure of more than 10 percent of selected items will result in rejection of final testing, adjusting, and balancing report. For sound pressure readings, a deviation of 3 dB will result in rejection of final testing. Variations in background noise must be considered.
4. Remedy the deficiency and notify the CxA to perform verification of failed portions.

3.11 GUARANTY REVIEW / SEASONAL TESTING

A. Refer to "Guaranty Review / Seasonal Testing" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for guaranty review and seasonal testing requirements.

END OF SECTION 230800

SECTION 230923 - DIRECT DIGITAL CONTROL (DDC) SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes: Direct digital control (DDC) system for HVAC.

1.3 DEFINITIONS

A. Algorithm: A logical procedure for solving a recurrent mathematical problem. A prescribed set of well-defined rules or processes for solving a problem in a finite number of steps.

B. Analog: A continuously varying signal value, such as current, flow, pressure, or temperature.

C. BACnet Specific Definitions:

1. BACnet: Building Automation Control Network Protocol, ASHRAE 135. A communications protocol allowing devices to communicate data and services over a network.
2. BACnet Interoperability Building Blocks (BIBBs): BIBB defines a small portion of BACnet functionality that is needed to perform a particular task. BIBBs are combined to build the BACnet functional requirements for a device.
3. BACnet/IP: Defines and allows using a reserved UDP socket to transmit BACnet messages over IP networks. A BACnet/IP network is a collection of one or more IP subnetworks that share the same BACnet network number.
4. BACnet Testing Laboratories (BTL): Organization responsible for testing products for compliance with ASHRAE 135, operated under direction of BACnet International.

D. Binary: Two-state signal where a high signal level represents "ON" or "OPEN" condition and a low signal level represents "OFF" or "CLOSED" condition. "Digital" is sometimes used interchangeably with "Binary" to indicate a two-state signal.

E. Controller: Generic term for any standalone, microprocessor-based, digital controller residing on a network, used for local or global control. Three types of controllers are indicated: network controllers, programmable application controllers, and application-specific controllers.

F. Control System Integrator: An entity that assists in expansion of existing enterprise system and support of additional operator interfaces to I/O being added to existing enterprise system.

G. COV: Changes of value.

H. Direct Digital Control System Provider: Authorized representative of, and trained by, Direct Digital Control system manufacturer and responsible for execution of Direct Digital Control system Work indicated.

I. Distributed Control: Processing of system data is decentralized and control decisions are made at subsystem level. System operational programs and information are provided to remote subsystems and status is reported back. On loss of communication, subsystems to be capable of operating in a standalone mode using the last best available data.

J. E/P: Voltage to pneumatic.

K. Gateway: Bidirectional protocol translator that connects control systems that use different communication protocols.

L. HLC: Heavy load conditions.

M. I/O: System through which information is received and transmitted. I/O refers to analog input (AI), binary input (BI), analog output (AO) and binary output (BO). Analog signals are continuous and represent control influences such as flow, level, moisture, pressure, and temperature. Binary signals convert electronic signals to digital pulses (values) and generally represent two-position operating and alarm status. "Digital," (DI) and (DO), is sometimes used interchangeably with "Binary," (BI) and (BO), respectively.

N. I/P: Current to pneumatic.

O. LAN: Local area network.

P. LNS: LonWorks Network Services.

Q. LON: Control network for universal use of distributed automation system in which free programmable intelligent nodes communicate using the standardized LonTalk open standard protocol (ISO/IEC 14908-1).

R. LON Specific Definitions:

1. FTT-10: Transmitter-Free Topology Transceiver.
2. LonMark International: Association comprising suppliers and installers of LonTalk networking protocol products. Association provides guidelines for implementing LonTalk protocol to ensure interoperability through a standard or consistent implementation.
3. LonTalk: An open standard protocol that uses a "Neuron Chip" for communication.
4. LonWorks: Local Operating Network open standard (ISO/IEC 14908) for networking platforms.
5. Node: Device that communicates using CTA-709.1-D protocol and that is connected to a CTA-709.1-D network.
6. Node Address: The logical address of a node on the network, consisting of a Domain number, Subnet number, and Node number. "Node number" portion of an address is a number assigned to device during installation, is unique within a subnet, and is not a factory-set unique Node ID.
7. Node ID: A unique 48-bit identifier assigned at factory to each CTA-709.1-D device. Sometimes called a "Neuron ID."
8. Program ID: An identifier (number) stored in a device (usually, EEPROM) that identifies node manufacturer, functionality of device (application and sequence), transceiver used, and intended device usage.
9. Standard Configuration Property Type (SCPT): Pronounced "skip-it." A standard format type for configuration properties.

10. Standard Network Variable Type (SNVT): Pronounced "snivet." A standard format type used to define data information transmitted and received by individual nodes. "SNVT" is used in two ways. It is an acronym for "Standard Network Variable Type" and is often used to indicate a network variable itself (i.e., it can mean "a network variable of a standard network variable type").
11. Subnet: Consists of a logical grouping of up to 127 nodes, where logical grouping is defined by node addressing. Each subnet is assigned a number, which is unique within a Domain. See "Node Address."
12. TP/FT-10: Free Topology Twisted Pair network defined by CTA-709.3 and is most common media type for a CTA-709.1-D control network.
13. TP/XF-1250: High-speed, 1.25 Mbps, twisted-pair, doubly terminated bus network defined by "LonMark Interoperability Guidelines" and typically used only to connect multiple TP/FT-10 networks.
14. User-Defined Configuration Property Type (UCPT): Pronounced "u-keep-it." A Configuration Property format type that is defined by device manufacturer.
15. User-Defined Network Variable Type (UNVT): Network variable format defined by device manufacturer. UNVTs create non-standard communications that other vendors' devices may not correctly interpret and may negatively impact system operation. UNVTs are not allowed.

S. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

T. Mobile Device: A data-enabled phone or tablet computer capable of connecting to a cellular data network and running a native control application or accessing a web interface.

U. Modbus TCP/IP: An open protocol for exchange of process data.

V. MS/TP: Master-slave/token-passing, ISO/IEC/IEEE 8802-3. Datalink protocol LAN option that uses twisted-pair wire for low-speed communication.

W. MTBF: Mean time between failures.

X. Network Controller: Digital controller, which supports a family of programmable application controllers and application-specific controllers, that communicates on peer-to-peer network for transmission of global data.

Y. Network Repeater: Device that receives data packet from one network and rebroadcasts it to another network. No routing information is added to protocol.

Z. Peer to Peer: Networking architecture that treats all network stations as equal partners.

AA. POT: Portable operator's terminal.

BB. RAM: Random access memory.

CC. RF: Radio frequency.

DD. Router: Device connecting two or more networks at network layer.

EE. Server: Computer used to maintain system configuration, historical and programming database.

FF. TCP/IP: Transport control protocol/Internet protocol.

GG. UPS: Uninterruptible power supply.

HH. USB: Universal Serial Bus.

II. User Datagram Protocol (UDP): This protocol assumes that the IP is used as the underlying protocol.

JJ. VAV: Variable air volume.

KK. WLED: White light emitting diode.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For Direct Digital Control system.

1. In addition to DDC General Conditions closeout requirements, include the following:

a. Project Record Drawings of as-built versions of submittal Shop Drawings provided in electronic PDF format.
b. Testing and commissioning reports and checklists of completed final versions of reports, checklists, and trend logs.
c. As-built versions of submittal Product Data.
d. Names, addresses, email addresses, and 24-hour telephone numbers of Installer and service representatives for Direct Digital Control system and products.
e. Operator's manual with procedures for operating control systems including logging on and off, handling alarms, producing point reports, trending data, overriding computer control, and changing set points and variables.
f. Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.
g. Instructional materials.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 DIRECT DIGITAL CONTROL (DDC) SYSTEM FOR HVAC

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Delta Controls Inc.
2. Johnson Controls, Inc.
3. Trane.

4. Or approved equal.

2.2 DIRECT DIGITAL CONTROL SYSTEM DESCRIPTION

A. Microprocessor-based monitoring and control including analog/digital conversion and program logic. A control loop or subsystem in which digital and analog information is received and processed by a microprocessor, and digital control signals are generated based on control algorithms and transmitted to field devices to achieve a set of predefined conditions.

1. Direct Digital Control system consisting of peer-to-peer network of distributed Direct Digital Control controllers, other network devices, operator interfaces, and software.

2.3 WEB ACCESS

A. Direct Digital Control system to be web based or web compatible.

1. Web-Based Access to Direct Digital Control System:

a. Direct Digital Control system software based on server thin-client architecture, designed around open standards of web technology. Direct Digital Control system server accessed using a web browser over Direct Digital Control system network, using City of New York's LAN, and remotely over Internet through City of New York's LAN.
b. Intent of thin-client architecture is to provide operators complete access to Direct Digital Control system via a web browser. No special software other than a web browser is required to access graphics, point displays, and trends; to configure trends, points, and controllers; and to edit programming.
c. Password-protected web access.

2. Web-Compatible Access to Direct Digital Control System:

a. Workstation or server to perform overall system supervision and configuration, graphical user interface, management report generation, and alarm annunciation.
b. Direct Digital Control system to support web browser access to building data. Operator using a standard web browser is able to access control graphics and change adjustable set points.
c. Password-protected web access.

2.4 PERFORMANCE REQUIREMENTS

A. Delivery of Selected Control Devices: Deliver to equipment and systems manufacturers for factory installation and to HVAC systems installers for field installation.

B. Engage a Controls Specialist to design Direct Digital Control system to satisfy requirements indicated.

1. System Performance Objectives:

a. Direct Digital Control system manages HVAC systems.
b. Direct Digital Control system operates HVAC systems to achieve optimum operating costs while using least possible energy and maintaining specified performance.

c. Direct Digital Control system responds to power failures, HVAC equipment failures, and adverse and emergency conditions encountered through connected I/O points.
d. Direct Digital Control system operates while unattended by an operator and through operator interaction.
e. Direct Digital Control system records trends and transactions of events and produces report information such as performance, energy, occupancies, and equipment operation.

C. Surface-Burning Characteristics: Products installed in ducts, equipment, and return-air paths complying with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

D. Direct Digital Control System Speed:

1. Response Time of Connected I/O:

a. Update AI point values connected to Direct Digital Control system at least every five seconds for use by Direct Digital Control controllers. Points used globally to also comply with this requirement.
b. Update BI point values connected to Direct Digital Control system at least every five seconds for use by Direct Digital Control controllers. Points used globally to also comply with this requirement.
c. AO points connected to Direct Digital Control system to begin to respond to controller output commands within two second(s). Global commands to also comply with this requirement.
d. BO point values connected to Direct Digital Control system to respond to controller output commands within two second(s). Global commands to also comply with this requirement.

2. Display of Connected I/O:

a. Update and display analog point COV connected to Direct Digital Control system at least every five seconds for use by operator.
b. Update and display binary point COV connected to Direct Digital Control system at least every five seconds for use by operator.
c. Update and display alarms of analog and digital points connected to Direct Digital Control system within 15 seconds of activation or change of state.
d. Update graphic display refresh within four seconds.
e. Point change of values and alarms displayed from workstation to workstation when multiple operators are viewing from multiple workstations to not exceed graphic refresh rate indicated.

E. Direct Digital Control System Data Storage:

1. Include capability to archive not less than 36 consecutive months of historical data for all I/O points connected to system, including alarms, event histories, transaction logs, trends, and other information indicated.
2. Cloud Storage:

a. Provide application-based and web browser interfaces to configure, upload, download, and manage data and to service plan with storage adequate to store all data for term indicated. Cloud storage uses IT industry standard database platforms and is capable of functions described in "Direct Digital Control Data Access" Paragraph.

F. Direct Digital Control Data Access:

1. When logged into the system, operator able to also interact with any Direct Digital Control controllers connected to Direct Digital Control system as required for functional operation of Direct Digital Control system.
2. Use for application configuration; for archiving, reporting, and trending of data; for operator transaction archiving and reporting; for network information management; for alarm annunciation; and for operator interface tasks and controls application management.

G. Future Expandability:

1. Direct Digital Control system size is expandable to an ultimate capacity of at least 1.5 times total I/O points indicated.
2. Design and install system networks to achieve ultimate capacity with only addition of Direct Digital Control controllers, I/O, and associated wiring and cable. Design and install initial network infrastructure to support ultimate capacity without having to remove and replace portions of network installation.
3. Operator interfaces installed initially do not require hardware and software additions and revisions for system when operating at ultimate capacity.

H. Environmental Conditions for Controllers, Gateways, and Routers:

1. Products to operate without performance degradation under ambient environmental temperature, pressure, and humidity conditions encountered for installed location.

   a. If product alone cannot comply with requirement, install product in a protective enclosure that is isolated and protected from conditions impacting performance. Enclosure to be internally insulated, electrically heated, cooled, and ventilated as required by product and application.

I. Environmental Conditions for Instruments and Actuators:

1. Instruments and actuators to operate without performance degradation under the ambient environmental temperature, pressure, humidity, and vibration conditions specified and encountered for installed location.

   a. If instruments and actuators alone cannot comply with requirement, install instruments and actuators in protective enclosures that are isolated and protected from conditions impacting performance. Enclosure is internally insulated, electrically heated, cooled, and ventilated as required by instrument and application.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify compatibility with and suitability of substrates.

B. Examine roughing-in for instruments installed in piping to verify actual locations of connections before installation.

C. Examine roughing-in for instruments installed in duct systems to verify actual locations of connections before installation.

D. Examine walls, floors, roofs, and ceilings for suitable conditions where product will be installed.

E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 DIRECT DIGITAL CONTROL SYSTEM INTERFACE WITH OTHER SYSTEMS AND EQUIPMENT

A. Communication Interface to Equipment with Integral Controls:

1. Direct Digital Control system has communication interface with equipment having integral controls and having communication interface for remote monitoring or control.
2. Equipment to Be Connected:

a. Domestic water booster pumps specified in Section 221123.13 "Domestic-Water Packaged Booster Pumps."
b. Sump pumps specified in Section 221429 "Sump Pumps."
c. Domestic water heaters specified in Section 223300 "Electric, Domestic-Water Heaters"
d. Air-terminal units specified in Section 233600 "Air Terminal Units."
e. Roof-top units specified in Section 237416.13 "Packaged, Large-Capacity, Rooftop Air-Conditioning Units."
f. Dedicated outdoor-air units specified in Section 237433 "Dedicated Outdoor-Air Units."
g. Variable refrigerant flow units specified in Section 238129 "Variable-Refrigerant-Flow HVAC Systems."

3.4 PREINSTALLATION INTEGRATION TESTING

A. Perform the following pretesting of other systems and equipment integration with Direct Digital Control system before field installation:

1. Test all communications in a controlled environment to ensure connectivity.
2. Load software and demonstrate functional compliance with each control sequence of operation indicated.
3. Using simulation, demonstrate compliance with sequences of operation and other requirements indicated including, but not limited to, the following:

   a. HVAC equipment controlled through Direct Digital Control system, such as boilers, chillers, pumps, and air-handling units.
   b. Equipment faults and system recovery with fault annunciation.
   c. Analog and Boolean value alarming and annunciation.

4. Develop a method for testing interfaces before deployment.
5. Submit documentation supporting compliance upon request.

3.5 CONTROL DEVICES FOR INSTALLATION BY INSTALLERS

A. Deliver selected control devices, specified in indicated HVAC instrumentation and control device Sections, to identified equipment and systems manufacturers for factory installation and to identified installers for field installation.

3.6 GENERAL INSTALLATION REQUIREMENTS

A. Install products to satisfy more stringent of all requirements indicated.

B. Install products level, plumb, parallel, and perpendicular with building construction.

C. If codes and referenced standards are more stringent than requirements indicated, comply with requirements in codes and referenced standards.

D. Fabricate openings and install sleeves in ceilings, floors, roof, and walls required by installation of products. Before proceeding with drilling, punching, and cutting, check for concealed work to avoid damage. Patch, flash, grout, seal, and refinish openings to match adjacent condition.

E. Firestop Penetrations Made in Fire-Rated Assemblies: Comply with requirements in Section 078413 "Penetration Firestopping."

F. Fastening Hardware:

1. Wrenches, pliers, and other tools that damage surfaces of rods, nuts, and other parts are prohibited for work of assembling and tightening fasteners.
2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.
3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

G. If product locations are not indicated, install products in locations that are accessible and that will permit service and maintenance from floor, equipment platforms, or catwalks without removal of permanently installed furniture and equipment.

3.7 INSTALLATION OF WORKSTATIONS

A. Color Graphics Application:

1. Use system schematics indicated on Drawings as starting point to create graphics.
2. Develop Project-specific library of symbols for representing system equipment and products.
3. Incorporate digital images of Project-completed installation into graphics where beneficial to enhance effect.
4. Submit sketch of graphic layout with description of all text for each graphic for Commissioner's review before creating graphic using graphics software.
5. Seek City of New York input in graphics development once using graphics software.
6. Make final editing on-site with Commissioner's review and feedback.
7. Refine graphics as necessary for Commissioner acceptance.
8. On receiving Commissioner acceptance, print a PDF file of each graphic and include with softcopy of Direct Digital Control system operation and maintenance manual.

3.8 INSTALLATION OF GATEWAYS

A. Install gateways if required for Direct Digital Control system communication interface requirements indicated.

1. Install gateway(s) required to suit indicated requirements.

B. Test gateways to verify that communication interface functions properly.

3.9 INSTALLATION OF ROUTERS

A. Install routers if required for Direct Digital Control system communication interface requirements indicated.

1. Install router(s) required to suit indicated requirements.

B. Test routers to verify that communication interface functions properly.

3.10 INSTALLATION OF CONTROLLERS

A. Install controllers in enclosures to comply with indicated requirements.

B. Connect controllers to field power supply.

C. Install controllers with latest version of applicable software and configure to execute requirements indicated.

D. Test and adjust controllers to verify operation of connected I/O to achieve performance indicated requirements while executing sequences of operation.

3.11 ELECTRIC POWER CONNECTIONS

A. Connect electrical power to Direct Digital Control system products requiring electrical power connections.

B. Electrical power to products not indicated with electric power is by Direct Digital Control system provider and installing trade to provide a fully functioning Direct Digital Control system. Work is to comply with NFPA 70, the New York City Electrical Code and other requirements indicated.

C. Comply with requirements in Section 262816 "Enclosed Switches and Circuit Breakers" for electrical power circuit breakers.

D. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical power conductors and cables.

E. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems" and Section 260533.16 "Boxes and Covers for Electrical Systems" for electrical power raceways and boxes.

3.12 NETWORK NAMING AND NUMBERING

A. Coordinate with Commissioner and provide unique naming and addressing for networks and devices.

B. ASHRAE 135 Networks:

1. MAC Address:

a. Assign and document a MAC address unique to its network for every network device.
b. Ethernet Networks: Document MAC address assigned at its creation.
c. MS/TP Networks: Assign from 00 to 64.

2. Network Numbering:

a. Assign unique numbers to each new network.
b. Provide ability for changing network number through device switches or operator interface.
c. Direct Digital Control system, with all possible connected LANs, can contain up to 65,534 unique networks.

3. Device Object Identifier Property Number:

a. Assign unique device object identifier property numbers or device instances for each device network.
b. Provide for future modification of device instance number by device switches or operator interface.
c. LAN is to support up to 4,194,302 unique devices.

4. Device Object Name Property Text:

a. Device object name property field to support 32 minimum printable characters.
b. Assign unique device "Object Name" property names with plain-English descriptive names for each device.

1) Example 1: Device object name for device controlling heating water boiler plant at Building 1000 would be "Heating Water System Bldg. 1000."
2) Example 2: Device object name for VAV terminal unit controller could be "VAV Unit 102."

5. Object Name Property Text for Other Than Device Objects:

a. Object name property field is to support 32 minimum printable characters.
b. Assign object name properties with plain-English names descriptive of application.

1) Example 1: "Zone 1 Temperature."
2) Example 2 "Fan Start and Stop."

6. Object Identifier Property Number for Other Than Device Objects:

a. Assign object identifier property numbers according to Drawings or tables indicated.
b. If not indicated, object identifier property numbers may be assigned at Installer's discretion but must be approved by Commissioner in advance, be documented, and be unique for like object types within device.

3.13 DIRECT DIGITAL CONTROL SYSTEM I/O CHECKOUT PROCEDURES

A. Check installed products before continuity tests, leak tests, and calibration.

B. Check instruments for proper location and accessibility.

C. Check instruments for proper installation on direction of flow, elevation, orientation, insertion depth, or other applicable considerations that will impact performance.

D. Check instrument tubing for proper isolation, fittings, slope, dirt legs, drains, material, and support.

E. Instrument Checkout:

1. Verify that instrument is correctly installed for location, orientation, direction, and operating clearances.
2. Verify that attachment is properly secured and sealed.
3. Verify that conduit connections are properly secured and sealed.
4. Verify that wiring is properly labeled with unique identification, correct type, and size and is securely attached to proper terminals.
5. Inspect instrument tag against approved submittal.
6. For instruments with tubing connections, verify that tubing attachment is secure and isolation valves have been provided.
7. For flow instruments, verify that recommended upstream and downstream distances have been maintained.
8. For temperature instruments, verify the following:

a. Sensing element type and proper material.
b. Length and insertion.

3.14 DIRECT DIGITAL CONTROL SYSTEM I/O ADJUSTMENT, CALIBRATION, AND TESTING

A. Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.

B. Provide written description of proposed field procedures and equipment for calibrating each type of instrument. Submit procedures before calibration and adjustment.

C. For each analog instrument, make three-point test of calibration for both linearity and accuracy.

D. Equipment and procedures used for calibration to comply with instrument manufacturer's written instructions.

E. Provide diagnostic and test equipment for calibration and adjustment.

1. Use field testing and diagnostic instruments and equipment with an accuracy at least twice the instrument accuracy of instrument to be calibrated. For example, test and calibrate an installed instrument with accuracy of 1 percent using field testing and diagnostic instrument with accuracy of 0.5 percent or better.

F. Calibrate each instrument in accordance with instruction manual supplied by instrument manufacturer.

G. If after calibration the indicated performance cannot be achieved, replace out-of-tolerance instruments.

H. Comply with field testing requirements and procedures indicated by ASHRAE's Guideline 11, "Field Testing of HVAC Controls Components," in the absence of specific requirements, and to supplement requirements indicated.

I. Analog Signals:

1. Check analog voltage signals using a precision voltage meter at zero, 50, and 100 percent.
2. Check analog current signals using a precision current meter at zero, 50, and 100 percent.
3. Check resistance signals for temperature sensors at zero, 50, and 100 percent of operating span using a precision-resistant source.

J. Digital Signals:

1. Check digital signals using a jumper wire.
2. Check digital signals using an ohmmeter to test for contact making or breaking.

K. Meters: Check meters at zero, 50, and 100 percent of Project design values.

L. Sensors: Check sensors at zero, 50, and 100 percent of Project design values.

M. Switches: Calibrate switches to make or break contact at set points indicated.

N. Transmitters:

1. Check and calibrate transmitters at zero, 50, and 100 percent of Project design values.

2. Calibrate resistance temperature transmitters at zero, 50, and 100 percent of span using a precision-resistant source.

3.15 DIRECT DIGITAL CONTROL SYSTEM CONTROLLER CHECKOUT

A. Verify power supply.

1. Verify voltage, phase, and hertz.
2. Verify that protection from power surges is installed and functioning.
3. Verify that ground fault protection is installed.
4. If applicable, verify if connected to UPS unit.
5. If applicable, verify if connected to backup power source.
6. If applicable, verify that power conditioning units are installed.

B. Verify that wire and cabling are properly secured to terminals and labeled with unique identification.

C. Verify that spare I/O capacity is provided.

3.16 DIRECT DIGITAL CONTROL SYSTEM VALIDATION TESTS

A. Perform validation tests before requesting final review of system. Before beginning testing, first submit Pretest Checklist and Test Plan.

B. After review of Pretest Checklist and Test Plan, execute all tests and procedures indicated in plan.

C. After testing is complete, submit completed Pretest Checklist.

D. Pretest Checklist: Submit the following list with items checked off once verified:

1. Detailed explanation for any items that are not completed or verified.
2. Required mechanical installation work is successfully completed and HVAC equipment is working correctly.

E. Test Plan:

1. Prepare and submit validation Test Plan including test procedures for performance validation tests.
2. Address all specified functions of Direct Digital Control system and sequences of operation in Test Plan.
3. Explain detailed actions and expected results to demonstrate compliance with requirements indicated.
4. Explain method for simulating necessary conditions of operation used to demonstrate performance.
5. Include Test Checklist to be used to check and initial that each test has been successfully completed.
6. Submit Test Plan documentation 10 business days before start of tests.

F. Validation Test:

1. Verify operating performance of each I/O point in Direct Digital Control system.

a. Verify analog I/O points at operating value.
b. Make adjustments to out-of-tolerance I/O points.

1) Identify I/O points for future reference.
2) Simulate abnormal conditions to demonstrate proper function of safety devices.
3) Replace instruments and controllers that cannot maintain performance indicated after adjustments.

2. Simulate conditions to demonstrate proper sequence of control.
3. Readjust settings to design values and observe ability of Direct Digital Control system to establish desired conditions.
4. 24 hours after initial validation test, do as follows:

   a. Re-check I/O points that required corrections during initial test.
   b. Identify I/O points that still require additional correction and make corrections necessary to achieve desired results.

5. 24 Hours after second validation test, do as follows:

   a. Re-check I/O points that required corrections during second test.
   b. Continue validation testing until I/O point is normal on two consecutive tests.

6. Completely check out, calibrate, and test all connected hardware and software to ensure that Direct Digital Control system performs according to requirements indicated.
7. After validation testing is complete, prepare and submit report indicating results of testing. For all I/O points that required correction, indicate how many validation re-tests it took to pass. Identify adjustments made for each test and indicate instruments that were replaced.

3.17 FINAL REVIEW

A. Submit written request to Commissioner and Commissioning Agent when Direct Digital Control system is ready for final review. State the following:

   1. Direct Digital Control system has been thoroughly inspected for compliance with Contract Documents and found to be in full compliance.
   2. Direct Digital Control system has been calibrated, adjusted, and tested and found to comply with requirements of operational stability, accuracy, speed, and other performance requirements indicated.
   3. Direct Digital Control system monitoring and control of HVAC systems results in operation according to sequences of operation indicated.
   4. Direct Digital Control system is complete and ready for final review.

B. Upon receipt of written request for final review, Commissioner and Commissioning Agent to start review within 10 business days and upon completion issue field report(s) documenting observations and deficiencies.

C. Take prompt action to remedy deficiencies indicated in reviewer's field report(s) and submit second written request after all deficiencies have been corrected. Repeat process until no deficiencies are reported.

D. Part of Direct Digital Control system final review to include demonstration to parties participating in final review.

   1. Provide staff familiar with Direct Digital Control system installed to demonstrate operation of Direct Digital Control system during final review.

2. Provide testing equipment to demonstrate accuracy and other performance requirements of Direct Digital Control system that is requested by reviewers during final review.
3. Demonstration to include, but not be limited to, the following:

    a. HVAC equipment and system hardwired and software safeties and life-safety functions are operating according to sequence of operation. Up to 10 I/O points to be randomly selected by reviewers. Additional I/O points may be selected by reviewers to discover problems with operation.
    b. Correct sequence of operation after electrical power interruption and resumption after electrical power is restored for randomly selected HVAC systems.
    c. Reporting of alarm conditions for randomly selected alarms, including different classes of alarms, to ensure that alarms are properly received by operators and operator workstations.
    d. Trends, summaries, logs, and reports set up for Project.
    e. Data entry to show Project-specific customizing capability including parameter changes.
    f. Step through penetration tree, display all graphics, demonstrate dynamic update, and direct access to graphics.
    g. Spreadsheet and curve plot software and its integration with database.
    h. Online user guide and help functions.
    i. For Each Operator Workstation:

        1) I/O points lists agree with naming conventions.
        2) Graphics are complete.
        3) UPS unit, if applicable, operates.

3.18 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.19 DEMONSTRATION

A. Engage a factory-authorized service representative with complete knowledge of Project-specific system installed to instruct City of New York's personnel to adjust and operate Direct Digital Control system.

1. Base extent of instruction on scope and complexity of Direct Digital Control system indicated.
2. Submit outline of instruction for Commissioner's review at least 10 business day before scheduling instruction.
3. Coordinate with Commissioner location of instruction and schedule instruction a minimum of 20 business days before expected Substantial Completion.
4. Provide each attendee with hard copies, and DVD or flash-drive with PDF copy of all materials and visual presentations.
5. Provide City of New York digital video and audio recordings of instruction.

END OF SECTION 230923

SECTION 230923.12 - CONTROL DAMPERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Rectangular control dampers with airfoil blades.
2. Rectangular control dampers with flat blades.
3. Round industrial-duty control dampers.
4. Electric and electronic control-damper actuators.

B. Related Requirements:

1. Section 230923 "Direct Digital Control (DDC) System for HVAC" for control equipment and software, relays, electrical power devices, uninterruptible power supply units, wire, and cable.
2. Section 230993.11 "Sequence of Operations for HVAC Direct Digital Control" for requirements that relate to this Section.

1.3 DEFINITIONS

A. RMS: Root-mean-square value of alternating voltage, which is the square root of the mean value of the square of the voltage values during a complete cycle.

B. Thermal Efficiency Ratio (E): Comparison of a tested damper's thermal performance against a v-groove blade reference damper. A damper with the same thermal efficiency as the reference damper would have an E value of 0 percent, while a damper that is 4 times as efficient would have an E value of 200 percent.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Rectangular control dampers with airfoil blades.
2. Rectangular control dampers with flat blades.
3. Electric and electronic control-damper actuators.

B. Product Data Submittals: For each damper and actuator:

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Operating characteristics, electrical characteristics, and furnished accessories indicating process operating range, accuracy over range, control signal over range, default control signal with loss of power, calibration data specific to each unique application, electrical power requirements, and limitations of ambient operating environment, including temperature and humidity.
3. Product description with complete technical data, performance curves, and product specification sheets.
4. Installation instructions, including factors affecting performance.

C. Shop Drawings:

1. Include plans, elevations, sections, and mounting details.
2. Include details of product assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

D. Coordination Drawings: Plan drawings and corresponding product installation details, drawn to scale, on which the following items are indicated and coordinated with each other, using input from installers of the items involved:

1. Product installation location indicated in relationship to room, duct, and equipment.
2. Size and location of wall access panels for control dampers and actuators installed behind walls.
3. Size and location of ceiling access panels for control dampers and actuators installed above inaccessible ceilings.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For control dampers.

1.7 QUALITY ASSURANCE

A. Refer to DDC Geneal Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE 62.1 Compliance: Applicable outdoor ventilation requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

D. Code Compliance: Comply with NYCECC.

E. Ground Fault: Properly ground products to prevent failing due to ground fault conditions.

F. Selection Criteria:

1. Multi-Blade Damper Configuration: As follows unless otherwise indicated on Drawings:

   a. Two-Position Control: Opposed or parallel.
   b. Equipment Isolation Applications: Opposed or parallel.
   c. Face and Bypass Applications: Opposed or parallel.
   d. Outdoor/Return Air-Mixing Applications: Opposed or parallel.
   e. All Other Applications: Opposed or parallel.

2. Pressure and Temperature: Control dampers suitable for operating conditions encountered by the application:
3. Fail-Safe Positions: As follows unless otherwise indicated on Drawings:

   a. Supply Air: Close.
   b. Return Air: Close.
   c. Outdoor Air: Close.
   d. Mixed Air: Close.
   e. Exhaust Air: Close.

4. Select dampers with smooth and stable operation throughout full range of operation over varying pressures and temperatures encountered.
5. Sizing: See Drawings

   a. Two-Position Dampers: Full size of duct or equipment connection unless otherwise indicated.

2.2 RECTANGULAR CONTROL DAMPERS WITH AIRFOIL BLADES

A. General Requirements:

1. Factory assemble multiple damper sections to provide a single damper assembly of size required by the application.

   a. Include multisection damper assemblies with intermediate reinforcing where required between individual sections being joined together. Construct reinforcing of same material (aluminum, galvanized steel, stainless steel) as damper frame.

2. Factory install actuator(s) as integral part of damper assembly. Coordinate, with damper manufacturer, field requirements for actuators, such as type, fail-safe position, power supply, location, and mounting requirements.

B. Rectangular Control Dampers with Aluminum Airfoil Blades and Frames:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Arrow United Industries.
    b. Greenheck Fan Corporation.
    c. Ruskin Company.
    d. Or approved equal.

2. Source Limitations: Obtain rectangular control dampers, with aluminum airfoil blades and frames, from single manufacturer.
3. Performance:

    a. Leakage:

        1) AMCA 511, Class 1A, at 1 in. wg Differential Static Pressure: Leakage not to exceed 3 cfm/sq. ft. against 1 in. wg Differential Static Pressure when tested in accordance with AMCA 500D.
        2) AMCA 511, Class 1, at 4 in. wg Differential Static Pressure: Leakage not to exceed 8 cfm/sq. ft. against 4 in. wg Differential Static Pressure when tested in accordance with AMCA 500D.

    b. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure with a maximum blade deflection of 1/180 of blade length.
    c. Temperature: Minus 40 to plus 250 deg F.
    d. Velocity: Up to 6000 fpm.

4. Construction:

    a. Frame:

        1) Material: ASTM B211/B211M, Alloy 6063 T5 extruded-aluminum profiles, minimum 0.125 inch thick.
        2) Width: Not less than 5 inches.

    b. Blades:

        1) Configuration: Parallel or opposed blade configuration as required by application.
        2) Material: ASTM B211/B211M, Alloy 6063 T5 extruded-aluminum profiles, 0.07 inch thick.
        3) Shape: Hollow, airfoil.
        4) Length: As required by close-off pressure rating, not to exceed 48 inches.

    c. Seals:

        1) Blades: Replaceable; extruded Santoprene, silicone, or damper manufacturer-offered equivalent, as required by performance requirements. Seals are mechanically attached in extruded blade slots.
        2) Jambs: Replaceable; stainless steel, compression type or mechanically attached extruded silicone.

    d. Axles:

1) Diameter: Minimum 0.5 inch.
2) Material: Aluminum, plated steel or stainless steel.
3) Mechanically attached to blades.

e. Bearings:

1) Material: Molded acetal Celcon/polycarbonate nylon synthetic or stainless steel sleeve, as required by operating conditions, mounted in frame.
2) Where blade axles are installed in vertical position, provide thrust bearings.

f. Linkage:

1) Hardware: Plated or stainless steel.
2) Material: Aluminum, plated steel or stainless steel.
3) Mounting: Concealed in frame.

C. Rectangular Control Dampers with Galvanized-Steel Airfoil Blades and Frames:

1. Source Limitations: Obtain rectangular control dampers, with galvanized-steel airfoil blades and frames, from single manufacturer.
2. Performance:

a. Leakage:

1) AMCA 511, Class 1A, at 1 in. wg Differential Static Pressure: Leakage not to exceed 3 cfm/sq. ft. against 1 in. wg Differential Static Pressure when tested in accordance with AMCA 500D.
2) AMCA 511, Class 1, at 4 in. wg Differential Static Pressure: Leakage not to exceed 8 cfm/sq. ft. against 4 in. wg Differential Static Pressure when tested in accordance with AMCA 500D.

b. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure with a maximum blade deflection of 1/180 of blade length.
c. Temperature: Minus 40 to plus 250 deg F.
d. Velocity: Up to 4000 fpm.

3. Construction:

a. Frame:

1) Material: ASTM A653/A653M galvanized steel, minimum 0.06 inch thick.
2) Width: Not less than 5 inches.

b. Blades:

1) Configuration: Parallel or opposed blade configuration as required by application.
2) Material: ASTM A653/A653M galvanized steel, 0.05 inch thick.
3) Shape: Hollow, airfoil.
4) Length: As required by close-off pressure rating, not to exceed 48 inches.
5) Width: Not to exceed 8 inches.

c. Seals:

1) Blades: Replaceable; extruded silicone, vinyl, or damper manufacturer-offered equivalent, as required by performance requirements. Seals are to be mechanically attached in extruded blade slots.
2) Jambs: Stainless steel, compression type.

d. Axles:

1) Diameter: Minimum 0.5 inch
2) Material: Plated steel or stainless steel.
3) Mechanically attached to blades.

e. Bearings:

1) Material: Molded acetal nylon or stainless steel sleeve, as required by operating conditions, mounted in frame.
2) Where blade axles are installed in vertical position, provide thrust bearings.

f. Linkage:

1) Hardware: Plated or stainless steel.
2) Material: Plated steel or stainless steel.
3) Mounting: Concealed in frame.

2.3 RECTANGULAR CONTROL DAMPERS WITH FLAT BLADES

A. General Requirements:

1. Factory assemble multiple damper sections to provide a single damper assembly of size required by the application.

a. Include multisection damper assemblies with intermediate reinforcing where required between individual sections being joined together. Construct reinforcing of same material (aluminum, galvanized steel, stainless steel) as damper frame.

2. Factory install actuator(s) as integral part of damper assembly. Coordinate, with damper manufacturer, field requirements for actuators, such as type, fail-safe position, power supply, location, and mounting requirements.

B. Rectangular Control Dampers with Aluminum Flat Blades and Frames:

1. Source Limitations: Obtain rectangular control dampers, with aluminum flat blades and frames, from single manufacturer.
2. Performance:

a. Leakage:

1) AMCA 511, Class 1, at 1 in. wg Differential Static Pressure: Leakage not to exceed 3.2 cfm/sq. ft. against 1 in. wg Differential Static Pressure when tested in accordance with AMCA 500D.

b. Pressure Rating: 2.0 in. wg.
c. Temperature: Minus 40 to plus 250 deg F.
d. Velocity: Up to 2000 fpm.

3. Construction:

a. Frame:

1) Material: ASTM B211/B211M, Alloy 6063 T5 extruded-aluminum profiles, minimum 0.08 inch thick.
2) Width: Not less than 5 inches.

b. Blades:

1) Configuration: Parallel or opposed blade configuration as required by application.
2) Material: ASTM B211/B211M, Alloy 6063 T5 extruded-aluminum profiles, 0.125 inch thick.
3) Shape: Single thickness.
4) Length: As required by pressure rating, not to exceed 48 inches.
5) Width: Not to exceed 6 inches.

c. Seals:

1) Blades: Replaceable; extruded silicone or vinyl, as required by performance requirements. Mechanically attached in extruded blade slots.
2) Jambs: Stainless steel, compression type.

d. Axles:

1) Diameter: Minimum 0.5 inch.
2) Material: Aluminum or plated steel.
3) Mechanically attached to blades.

e. Bearings:

1) Material: Celcon, polycarbonate or synthetic, mounted in frame.

f. Linkage:

1) Hardware: Plated or stainless steel.
2) Material: Aluminum or plated steel.
3) Mounting: Concealed in frame.

C. Rectangular Control Dampers with Galvanized-Steel Flat Blades and Frames:

1. Source Limitations: Obtain rectangular control dampers, with galvanized-steel flat blades and frames, from single manufacturer.
2. Performance:

    a. Leakage:

        1) AMCA 511, Class II, at 1 in. wg Differential Static Pressure: Leakage not to exceed 5.4 cfm/sq. ft. against 1 in. wg Differential Static Pressure when tested in accordance with AMCA 500D.

    b. Pressure Drop: 0.1 in. wg at 1500 fpm across a 24-by-24-inch damper when tested in accordance with AMCA 500D, figure 5.3.
    c. Pressure Rating: 2.0 in. wg.
    d. Temperature: Minus 20 to plus 185 deg F.
    e. Velocity: Up to 2000 fpm.

3. Construction:

    a. Frame:

        1) Material: ASTM A653/A653M galvanized steel, minimum 0.06 inch thick.
        2) Arrangement: Hat-shaped channel with integral extended face flange(s) having mating face of minimum 1 inch for attachment to duct flanges, plenum walls, and equipment.
        3) Width: Not less than 5 inches.

    b. Blades:

        1) Configuration: Parallel or opposed blade configuration as required by application.
        2) Material: ASTM A653/A653M galvanized steel, 0.06 inch thick.
        3) Shape: Single thickness with bends for reinforcing.
        4) Length: As required by pressure rating, not to exceed 48 inches.
        5) Width: Not to exceed 8 inches.

    c. Seals:

        1) Blades: Replaceable; extruded silicone, vinyl, as required by performance requirements. Seals are to be mechanically attached in extruded blade slots.
        2) Jambs: Stainless steel, compression type.

    d. Axles:

        1) Diameter: Minimum 0.375 inch.
        2) Material: Plated steel or stainless steel , specific to application indicated.
        3) Mechanically attached to blades.

    e. Bearings:

        1) Material: Molded nylon or synthetic, or stainless steel sleeve, as required by operating conditions, mounted in frame.
        2) Where blade axles are installed in vertical position, provide thrust bearings.

f. Linkage:

1) Hardware: Plated or stainless steel.
2) Material: Plated steel or stainless steel.
3) Mounting: Concealed in frame.

2.4 GENERAL CONTROL-DAMPER ACTUATORS REQUIREMENTS

A. Select actuators to operate related damper(s) with sufficient reserve power to provide smooth modulating action or two-position action and proper speed of response at velocity and pressure conditions to which the damper is subjected.

B. Select actuators with sufficient power and torque to close off against the maximum system pressures encountered. Actuators are to be sized to close off against the fan shutoff pressure as a minimum requirement.

C. The total damper area operated by an actuator is not to exceed 80 percent of manufacturer's maximum area rating.

D. Provide one actuator for each damper assembly where possible. Operate multiple actuators required to drive a single damper assembly in unison.

E. Avoid the use of excessively oversized actuators, which could overdrive and cause linkage failure when the damper blade has reached either its full open or closed position.

F. Use jackshafts and shaft couplings in lieu of blade-to-blade linkages when driving axially aligned damper sections.

G. Provide mounting hardware and linkages for connecting actuator to damper.

H. Select actuators to fail-safe in desired position in the event of a power and signal failure.

I. Actuator Fail-Safe Positions: See Drawings.

2.5 ELECTRIC AND ELECTRONIC CONTROL-DAMPER ACTUATORS

A. Source Limitations: Obtain electric and electronic control-damper actuators from single manufacturer.

B. Type: Motor operated, with or without gears, electric and electronic.

C. Voltage:

1. See Drawings .
2. Actuator to deliver torque required for continuous uniform movement of controlled device from limit to limit when operated at rated voltage.
3. Actuator to function properly within a range of 85 to 120 percent of nameplate voltage.

D. Construction:

1. Less Than 100 W: Fiber or reinforced nylon gears with steel shaft, copper alloy or nylon bearings, and pressed-steel enclosures.
2. 100 up to 400 W: Gears ground steel, oil immersed, shaft-hardened steel running in bronze, copper alloy, or ball bearings. Operator and gear trains are to be totally enclosed in dustproof cast-iron, cast-steel, or cast-aluminum housing.
3. Greater Than 400 W: Totally enclosed reversible induction motors with auxiliary hand crank and permanently lubricated bearings.

E. Local Field Adjustment: Make spring-return actuators easily switchable from fail-safe open to fail-safe closed in the field without replacement.

F. Local Manual Override: Provide gear-type actuators with an external manual adjustment mechanism to allow manual positioning of the damper when the actuator is not powered.

G. Two-Position Actuators: Single direction, spring return or reversing type.

H. Modulating Actuators:

1. Capable of stopping at all points across full range, and starting in either direction from any point in range.
2. Control Input Signal:

a. Three Point, Tristate, or Floating Point: Clockwise and counter-clockwise inputs. One input drives actuator to open position, and other input drives actuator to close position. No signal of either input remains in last position.
b. Proportional: Actuator drives proportional to input signal and modulates throughout its angle of rotation. Suitable for 0 to 10 or 2 to 10 V dc and 4 to 20 mA signals.
c. Pulse Width Modulation (PWM): Actuator drives to a specified position according to a pulse duration (length) of signal from a dry-contact closure, triac sink, or source controller.
d. Programmable Multifunction:

1) Control input, position feedback, and running time are to be factory or field programmable.
2) Diagnostic feedback of hunting or oscillation, mechanical overload, mechanical travel, and mechanical load limit.
3) Service data, including at a minimum, number of hours powered and number of hours in motion.

I. Position Feedback:

1. Where indicated, equip two-position actuators with limit switches or other positive means of a position indication signal for remote monitoring of open and close position.
2. Where indicated, equip modulating actuators with a position feedback through current or voltage signal for remote monitoring.
3. Provide a position indicator and graduated scale on each actuator indicating open and closed travel limits.

J. Fail-Safe:

1. Where indicated, provide actuator to fail-safe to an end position.

2. Internal spring-return mechanism to drive controlled device to an end position (open or close) on loss of power.
3. Batteries, capacitors, and other nonmechanical forms of fail-safe operation are acceptable only where uniquely indicated.

K. Integral Overload Protection:

1. Provide against overload throughout the entire operating range in both directions.
2. Electronic overload, digital rotation sensing circuitry, mechanical end switches, or magnetic clutches are acceptable methods of protection.

L. Damper Attachment:

1. Unless otherwise required for damper interface, provide actuator designed to be directly coupled to damper shaft without need for connecting linkages.
2. Attach actuator to damper drive shaft in a way that ensures maximum transfer of power and torque without slippage.
3. Bolt and setscrew method of attachment is acceptable only if provided with at least two points of attachment.

M. Temperature and Humidity:

1. Temperature: Suitable for operating temperature range encountered by application with minimum operating temperature range of minus 20 to plus 120 deg F.
2. Humidity: Suitable for humidity range encountered by application; minimum operating range is to be from 5 to 95 percent relative humidity, noncondensing.

N. Enclosure:

1. Suitable for ambient conditions encountered by application.
2. NEMA 250, Type 2 or Type 4 for indoor and protected applications.
3. NEMA 250, Type 4 or Type 4X for outdoor and unprotected applications.
4. Provide actuator enclosure with a heater and controller where required by application.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for dampers and instruments installed in duct systems to verify actual locations of connections before installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 CONTROL-DAMPER APPLICATIONS

A. Select from damper types indicated to achieve performance requirements and characteristics indicated while subjected to full range of system operation encountered.

3.4 INSTALLATION, GENERAL

A. Furnish and install products required to satisfy most stringent requirements indicated.

B. Properly support dampers and actuators, wiring, and conduit to comply with requirements indicated. Brace all products to prevent lateral movement and sway or a break in attachment when subjected to a seismic, wind, or other forces common to the application.

C. Provide ceiling, floor, roof, and wall openings, and sleeves required by installation. Before proceeding with drilling, punching, or cutting, check location first for concealed products that could potentially be damaged. Patch, flash, grout, seal, and refinish openings to match adjacent condition.

D. Seal penetrations made in fire-rated and acoustically rated assemblies.

E. Fastening Hardware:

1. Wrenches, pliers, or other tools that will cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for assembling and tightening nuts.
2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.
3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

F. Install products in locations that are accessible and that will permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for personnel access, confirm unrestricted ladder placement is possible under occupied condition.

3.5 CONTROL DAMPERS

A. Install smooth transitions, not exceeding 30 degrees, to dampers larger or smaller than adjacent duct. Install transitions as close to damper as possible but at distance to avoid interference and impact to performance. Consult manufacturer for recommended clearance.

B. Clearance:

1. Locate dampers for easy access and provide separate support of dampers that cannot be handled by service personnel without hoisting mechanism.
2. Install dampers with at least 24 inches of clear space on sides of dampers requiring service access unless more space is recommended by manufacturer. Provide code required clearances as applicable.

C. Service Access:

1. Install dampers and actuators to be accessible for visual inspection and service.

2. Install access door(s) in duct or equipment located upstream of damper to allow service personnel to hand clean any portion of damper, linkage, and actuator. Comply with requirements in Section 233300 "Air Duct Accessories."

D. Install dampers straight and true, level in all planes, and square in all dimensions.

E. Install supplementary structural reinforcement for large multiple-section dampers if factory-furnished support alone cannot handle loading.

F. Attach field-installed actuator(s) to damper drive shaft.

G. For duct-mounted and equipment-mounted dampers installed outside of equipment, install a visible and accessible indication of damper position from outside.

3.6 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Each piece of wire, cable, and tubing is to have the same designation at each end for operators to determine continuity at points of connection. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Install engraved phenolic nameplate with damper identification on damper.

3.7 ELECTRICAL CONNECTIONS

A. Install electrical power to field-mounted control devices requiring electrical power.

B. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

D. Furnish and install raceways. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems."

E. Furnish and install circuit breakers. Comply with requirements in Section 262816 "Enclosed Switches and Circuit Breakers."

F. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

3.8 CONTROL CONNECTIONS

A. Install control signal wiring to field-mounted control devices.

B. Furnish and install raceways. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems."

3.9 CLEANING

A. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from exposed surfaces.

3.10 STARTUP

A. Control-Damper Checkout:

1. Check installed products before continuity tests, leak tests, and calibration.
2. Check dampers for proper location and accessibility.
3. Verify that control dampers are installed correctly for flow direction.
4. Verify that proper blade alignment, either parallel or opposed, has been provided.
5. Verify that damper frame attachment is properly secured and sealed.
6. Verify that damper actuator and damper linkage attachment are secure.
7. Verify that actuator wiring is complete, enclosed, and connected to correct power source.
8. Verify that damper blade travel is smooth and unobstructed throughout operating range.

3.11 ADJUSTMENT, CALIBRATION, AND TESTING:

A. Stroke and adjust control dampers following manufacturer's recommended procedure, from 100 percent open to 100 percent closed back to 100 percent open.

B. For control dampers equipped with positive position indication, check feedback signal at multiple positions to confirm proper position indication.

END OF SECTION 230923.12

SECTION 230923.13 - ENERGY METERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Electric power meters.

B. Related Requirements:

1. Section 230923 "Direct-Digital Control System for HVAC" for control equipment and software, relays, electrical power devices, uninterruptible power supply units, wire, and cable.
2. Section 230993.11 "Sequence of Operations for HVAC Direct Digital Control" for requirements that relate to this Section.

1.3 DEFINITIONS

A. DIN: Deutsche Institut fur Normung (German Institute for Standards).

B. DZR: Dezincification resistant.

C. Ethernet: Local area network based on IEEE 802.3.1.

D. EEPROM: Electrically erasable programmable read-only memory.

E. Firmware: Software (programs or data) that has been written onto read-only memory (ROM). Firmware is a combination of software and hardware. Storage media with ROMs that have data or programs recorded on them are firmware.

F. I/O: Input/output.

G. IP: Ingress protection ratings.

H. PEEK: Polyetheretherketone.

I. PLC: Programmable logic controller.

J. PPS: Polyphenylene sulfide.

K. RMS: Root-mean-square value of alternating voltage, which is the square root of the mean value of the square of the voltage values during a complete cycle.

L. RS-232: A TIA standard for asynchronous serial data communications between terminal devices.

M. RS-485: A TIA standard for multipoint communications using two twisted pairs.

N. RTD: Resistance temperature detector.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For electric power meters, include the following:

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Operating characteristics, electrical characteristics, and furnished accessories indicating electrical power requirements.
3. Product description with complete technical data, performance curves, and product specification sheets.

B. Shop Drawings:

1. Include plans, elevations, sections, and details.
2. Include details of product assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each product and component requiring a certificate.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For energy meters to include in operation and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC Geneal Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 THERMAL ENERGY METERS

A. Thermal Energy Meter with In-Line Electromagnetic Flow Sensor:

1. Power Supply:

a. Internal Power: As required by flow meter.

2.2 ELECTRIC POWER METERS

A. Performance Requirements: Manufacturer is to certify that each electric power meter complies with specified performance requirements and characteristics. Certificate is required.

B. Electric Power Meter - Basic:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Eaton.
b. Omron Americas.
c. Siemens Industry, Inc., Building Technologies Division.
d. Square D; Schneider Electric USA.
e. Or approved equal.

2. Description: Separately mounted, permanently installed, electronic power meter.

a. Capable of metering four-wire wye, three-wire delta, and single-phase power systems.
b. For renewable energy applications, meters to include bidirectional monitoring and measurement of imported and exported power.
c. Include with current transformers and transducers suitable for the application.

3. Features:

a. Measured energy consumption stored in nonvolatile memory.
b. Programmable demand measurements for multiple intervals and varying durations.
c. Automatic phase reversal compensation so insensitive to CT load orientation.
d. Separate control power inputs so meter can be powered from a different power source than the power service being measured.
e. Configurable for use with different potential transformers.
f. Data Recording: Store values in nonvolatile memory; indicate which of the three phases relates to the value. Attach a date and time stamp to the peak values and the alarms.
g. Alarms: Transmit an output signal and show on display when alarmed. Provide for no fewer than 3 metered items.
h. Listed in accordance with UL 508.

4. Measurements:

a. Accumulated Real Energy (kWh): For each phase and total of all phases.
b. Accumulated Reactive Energy (kVARh): Total for all phases.
c. Apparent Energy (kVAh): Totals for all phases.
d. Net Present Demand for Real (kW), Reactive (kVAR) and Apparent (kVA) Power: Over a user-specified interval (block or sliding window).
e. Maximum (peak) real (kW), reactive (kVAR) and apparent (kVA) demand intervals.
f. Instantaneous Real (kW), Reactive (kVAR) and Apparent Power (kVA): By phase and in total.
g. Current (amps) for each phase and average of all phases.
h. Phase-to-phase voltage for each phase and average of all phase pairs.
i. Phase-to-neutral voltage for each phase pair and average of all phases.
j. Power factor for each phase and average of all phases.
k. AC frequency.

5. Performance:

a. Accuracy: Comply with ANSI C12.20, Class 0.5 and IEC 62053-22, Class 0,2S.
b. Ambient Humidity: Less than 95 percent, noncondensing.
c. Ambient Temperature: Minus 10 to plus 130 deg F.
d. Current:

1) Rated Primary: 5 to 600 A.
2) Scaled: 5 to 32000 A.

e. Measured Voltage: 90 to 600 V ac, 50 or 60 Hz.

6. Enclosure:

a. Indoor Applications: NEMA 250, Type 1; DIN rail mount in accordance with IEC 60715 (EN).
b. Outdoor Applications: NEMA 250, Type 4 or 4X.

7. Display: Backlit LCD showing measured values, alarm functions, and outputs.
8. Digital Output Signals:

a. Alarm: Normally closed.
b. Real Energy: Pulse (normally open).

9. Serial Communication Interface: TIA RS-485 2-wire connection; BACnet MS/TP Modbus RTU protocol.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for instruments installed in piping to verify actual locations of connections before installation.

C. Examine roughing-in for instruments installed in duct systems to verify actual locations of connections before installation.

D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Install products level, plumb, parallel, and perpendicular with building construction.

B. Support instruments, tubing, piping wiring, and conduit to comply with requirements indicated. Brace all products to prevent lateral movement and sway or a break in attachment when subjected to a force.

C. Install products in locations that are accessible and that will permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for access, confirm unrestricted ladder placement is possible under occupied condition.

D. Mount meters located in mechanical and electrical rooms and other similar space not subject to code, state, and federal accessibility requirements, within a range of 42 to 72 inches, but preferably at 60 inches above the adjacent floor, grade, or service catwalk or platform.

3.4 INSTALLATION OF THERMAL METERS

A. Install meters not integral to flow sensors in vicinity of flow sensor. Where multiple meters are serving same system and located in same room, co-locate them by system to provide service personnel a single and convenient location for inspection and service.

B. Install meter flow sensors in straight sections of piping with manufacturer-recommended straight piping upstream and downstream.

C. Alert manufacturer where installation cannot accommodate recommended clearance, and solicit recommendations for field modifications to installation, such as flow straighteners, to improve condition.

D. Install pipe reducers for in-line meters smaller than line size. Install reducers at distance from meter to avoid interference and impact on performance.

E. Install in-line meters with flanges or unions to provide drop-in and -out installation.

F. Insertion Meters:

1. Install system process connections full size of meter connection, but not less than NPS 2. Provide stainless steel bushing if required to mate to system connection.
2. Install meter in top dead center of horizontal pipe positioned in an accessible location to allow for inspection and replacement.
3. In applications where top-dead-center location is not possible due to field constraints, install meter at location along top half of pipe if acceptable by manufacturer for mounting orientation.

3.5 INSTALLATION OF POWER METERS

A. Install meters not integral to flow sensors in vicinity of flow sensor. Where multiple meters are serving same system and located in same room, co-locate them by system to provide service personnel a single and convenient location for inspection and service.

B. Install meter flow sensors in straight sections of piping with manufacturer-recommended straight piping upstream and downstream.

C. Alert manufacturer where installation cannot accommodate recommended clearance, and solicit recommendations for field modifications to installation, such as flow straighteners, to improve condition.

D. Install pipe reducers for in-line meters smaller than line size. Install reducers at distance from meter to avoid interference and impact on performance.

E. Install in-line meters with flanges or unions to provide drop-in and -out installation.

3.6 ELECTRICAL CONNECTIONS

A. Furnish and install electrical power to products requiring electrical connections.

B. Furnish and install power wiring. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

D. Furnish and install raceways. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems."

E. Furnish and install circuit breakers. Comply with requirements in Section 262816 "Enclosed Switches and Circuit Breakers."

F. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

G. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate to be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate to be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.7 CONTROL CONNECTIONS

A. Install control signal wiring to field-mounted control devices.

3.8 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Each piece of wire and cable is to have the same designation at each end for operators to determine continuity at points of connection. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Install engraved phenolic nameplate with instrument identification and on face of ceiling directly below instruments concealed above ceilings.

3.9 CLEANING

A. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from exposed surfaces.

3.10 CHECKOUT PROCEDURES

A. Checkout Requirements:

1. Check out installed products before continuity tests, leak tests, and calibration.
2. Check instruments for proper location and accessibility.
3. Check instruments for proper installation with respect to direction of flow, elevation, orientation, insertion depth, or other applicable considerations that will impact performance.
4. Verify that sensors are installed correctly with respect to flow direction.
5. Verify that sensor attachment is properly secured and sealed.
6. Inspect meter tags against approved submittal.
7. Verify that recommended upstream and downstream distances have been maintained.

3.11 ADJUSTMENT, CALIBRATION, AND TESTING

A. Description:

1. Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.
2. Provide a written description of proposed field procedures and equipment for calibrating each type of instrument. Submit procedures before calibration and adjustment.
3. Equipment and procedures used for calibration are to meet instrument manufacturer's written instructions.
4. Provide diagnostic and test equipment for calibration and adjustment.
5. Calibrate each instrument according to instrument instruction manual supplied by manufacturer.
6. If after calibration indicated performance cannot be achieved, replace out-of-tolerance instruments.
7. Comply with field-testing requirements and procedures indicated by ASHRAE Guideline 11 in the absence of specific requirements, and to supplement requirements indicated.

B. Analog Signals:

1. Check analog voltage signals using a precision voltage meter at zero, 50, and 100 percent.
2. Check analog current signals using a precision current meter at zero, 50, and 100 percent.
3. Check resistance signals for temperature sensors at zero, 50, and 100 percent of operating span using a precision-resistant source.

C. Digital Signals:

1. Check digital signals using a jumper wire.
2. Check digital signals using an ohmmeter to test for contact.

3.12 GUARANTY SERVICE

A. Beginning at Substantial Completion, verify that guaranty service includes 12 months' full maintenance by installer. Include repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Verify that parts and supplies are manufacturer's authorized replacement parts and supplies.

3.13 DEMONSTRATION

A. Engage a factory-authorized service representative to demonstrate City of New York's personnel to adjust and operate instrumentation and control devices.

B. Coordinate instruction video with operation and maintenance manuals and classroom instruction for use by City of New York in operating, and troubleshooting.

C. Record instruction and submit digital files with closeout documents for City of New York's future use.

END OF SECTION 230923.13

SECTION 230923.18 - LEAK DETECTION INSTRUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Leak-detection switches.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data Submittals: For each product.

1. Operating characteristics, electrical characteristics, and furnished accessories indicating control signal, default control signal with loss of power, and electrical power requirements.
2. Product description with complete technical data and product specification sheets.
3. Installation operation and maintenance instructions, including factors affecting performance.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: To include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 LEAK-DETECTION SWITCHES

A. Point-Type, Leak-Detection Switches:

1. Manufacturer: Subject to compliance with requirements, provide products by one of the following:

a. Veris Industries.
b. Vertiv Co.
c. DiversiTech.
d. Or approved equal.

2. Source Limitations: Obtain point-type, leak-detection switches from single manufacturer.
3. Features:

a. Alarms: Audible alarm with relay output for remote indication.
b. Operation: Alarm activation based on detection of liquid by change in resistance.

4. Performance:

a. Field Power: 24 V dc.
b. Service: Water.
c. Temperature Limits: 32 to 122 deg F.
d. Sensing Height: Adjustable.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

A. Properly support instruments, wiring, and conduit to comply with requirements indicated. Brace all products to prevent lateral movement and sway or a break in attachment.

B. Fastening Hardware:

1. Wrenches, pliers, and other tools that cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for work of assembling and tightening nuts.
2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force, or by oversized wrenches.
3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

C. Install products in locations that are accessible and that permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for access, confirm unrestricted ladder placement is possible under occupied condition.

3.4 INSTALLATION OF LEAK-DETECTION SWITCHES

A. Use manufacturer mounting brackets to accommodate field mounting. Securely support and brace products to prevent movement.

3.5 CONTROL CONNECTIONS

A. Install control signal wiring to field-mounted control devices.

3.6 CLEANING

A. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from exposed surfaces.

3.7 CHECKOUT PROCEDURES

A. Check installed products before continuity tests and calibration.

B. Check instruments for proper location and accessibility.

C. Check instruments for proper installation for applicable considerations that impact performance.

D. Apply test fluid to floor or substrate to check proper switch operation. Test fluid is to be the same as for operation.

END OF SECTION 230923.18

SECTION 230993.11 - SEQUENCE OF OPERATIONS FOR HVAC DIRECT DIGITAL CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes control sequences for Direct Digital Control for HVAC systems, subsystems, and equipment.

B. Related Requirements:

1. Section 230923 "Direct Digital Control Systems for HVAC" for control equipment.

1.3 DEFINITIONS

A. Analog Output: Proportional output signal (zero- to 10-V dc, 4 to 20 mA).

B. Binary Output: On/off output signal or contact closure.

C. Digital Output: Data output that must be interpreted digitally.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. An instrumentation list for each controlled system. Label each element of the controlled system in table format. Show, in the table element name, type of device, manufacturer, model number, and control device product data sheet number.
2. A complete description of the operation of the control system, including sequences of operation. Include and reference a schematic diagram of the controlled system.

B. Shop Drawings:

1. Riser diagrams showing control network layout, communication protocol, and wire types.
2. Schematic diagram of each controlled system. Include all control points labeled with point names shown or listed. Show the location of control elements in the system.

3. Wiring diagram for each controlled system. Show all control elements labels. Where a control element is the same as that shown on the control system schematic, label with the same name. Label all terminals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 SEQUENCES

A. Refer to drawings for sequence of operations for equipment.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 230993.11

SECTION 232123 - HYDRONIC PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Automatic condensate pump units.

1.3 DEFINITIONS

A. ECM: Electronically commutated motor.

B. EPDM: Ethylene propylene diene monomer.

C. EPR: Ethylene propylene rubber.

D. FKM: Fluoroelastomer polymer.

E. HI: Hydraulic Institute.

F. NBR: Nitrile rubber or Buna-N.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of pump.

1. Include certified performance curves and rated capacities, operating characteristics, furnished specialties, final impeller dimensions, and accessories for each type of product indicated.
2. Indicate pump's operating point on curves.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For pumps to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 WARRANTY

A. Manufacturer agrees to repair or replace components of the hydronic pumps that fail in materials or workmanship within specified warranty period.

1. Warranty Period:1 year parts from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 AUTOMATIC CONDENSATE PUMP UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following::

1. Beckett Corporation.
2. Hartell Pumps; Milton Roy.
3. Little Giant Pump Co.
4. Or approved equal.

B. Source Limitations: Obtain pump units from single source from single manufacturer.

C. Description: Packaged units with corrosion-resistant pump, plastic tank with cover, and automatic controls. Collects and removes condensate from fan coil units, air handling units, condensing boilers, and similar components. Include factory- or field-installed check valve and 72-inch- minimum, electrical power cord with plug.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine equipment foundations and anchor-bolt locations for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PUMP INSTALLATION

A. Install pumps to provide access for periodic maintenance including removing motors, impellers, couplings, and accessories.

B. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.

C. Automatic Condensate Pump Units: Install units for collecting condensate and extend to open drain.

3.4 PIPING CONNECTIONS

A. Where installing piping adjacent to pump, allow space for service and maintenance.

B. Connect piping to pumps. Install valves that are same size as piping connected to pumps.

C. Install check valve on each condensate pump unit discharge unless unit has a factory-installed check valve.

3.5 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.6 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

END OF SECTION 232123

SECTION 232300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.3 ACTION SUBMITTALS

A. Product Data Submittals: For each product.

1. Submit data for each type of refrigerant piping, fitting, valve, piping specialty, and refrigerant.

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store piping with end caps in place to ensure that piping interior and exterior are clean when installed.

B. Prepare valves and specialties for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads and other end connections.

C. Use the following precautions during storage:

1. Maintain valve and specialty end protection.
2. Store valves and specialties indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASHRAE 15.

B. Comply with ASME B31.5.

2.2 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B88, Type K or L.

B. Wrought-Copper Fittings, Brazed Joint: ASME B16.50.

C. Brazing Filler Metals: AWS A5.8M/A5.8.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF PIPING, GENERAL

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping in accordance with ASHRAE 15.

C. Install refrigerant piping in accordance with VRF manufacturer's requirements, recommendations, and guidelines.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Install piping adjacent to machines to allow service and maintenance.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

L. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Section 083113 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

M. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

N. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

O. Identify refrigerant piping and valves in accordance with Section 230553 "Identification for HVAC Piping and Equipment."

P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230500 "Common Work Results for HVAC."

Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230500 "Common Work Results for HVAC."

R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230500 "Common Work Results for HVAC."

3.3 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Soldered Joints: Construct joints in accordance with ASTM B828 or CDA's "Copper Tube Handbook."

D. Brazed Joints: Construct joints in accordance with AWS BRH, "Brazing Handbook," Ch. 35, "Pipe and Tubing."

1. Use Type BCuP (copper-phosphorus) alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg (cadmium-free silver) alloy for joining copper with bronze or steel.

3.4 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hangers, supports, and anchor devices.

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 ft. long.
2. Roller hangers and spring hangers for individual horizontal runs 20 ft. or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 ft. or longer, supported on a trapeze.

4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing, with maximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58, or the provisions of the NYC Building Code, whichever are most stringent.

D. Support horizontal piping within 12 inches of each fitting.

E. Support vertical runs of copper tubing to comply with MSS SP-58, or of the provisions of the NYC Building Code, whichever are most stringent.

3.5 SYSTEM CHARGING

A. Charge system using the VRF manufacturer's procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
4. Charge system with a new filter-dryer core in charging line.

END OF SECTION 232300

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round and flat-oval ducts and fittings.
3. Sheet metal materials.
4. Duct liner.

B. Related Requirements:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top and bottom of ducts.
5. Dimensions of all duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.

8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment and vibration isolation.

C. Coordination Drawings: A single set of plans or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Ductwork: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and with performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports are to withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" .

C. Airstream Surfaces: Surfaces in contact with airstream comply with requirements in ASHRAE 62.1.

D. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment," and Section 7 - "Construction and System Startup."

E. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

F. Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on Drawings are inside clear dimensions and do not include insulation or duct wall thickness.

2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.
2. For ducts exposed to weather, construct of stainless steel indicated by manufacturer to be suitable for outdoor installation.

B. Transverse Joints: Fabricate joints in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. For ducts with longest side less than 36 inches, select joint types in accordance with Figure 2-1.
2. For ducts with longest side 36 inches or greater, use flange joint connector Type T-22, T-24, T-24A, T-25a, or T-25b. Factory-fabricated flanged duct connection system may be used if submitted and approved by the Commissioner.

C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.
2. For ducts installed outside of the building, whether directly exposed to weather or not due to insulation or weatherproofing, construct of stainless steel indicated by manufacturer to be suitable for outdoor installation.

B. Source Limitations: Obtain single-wall round and flat oval ducts and fittings from single manufacturer.

C. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

D. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

E. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

F. Tees and Laterals: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.4 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials are to be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A653/A653M.

1. Galvanized Coating Designation: G60.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Stainless Steel Sheets: Comply with ASTM A480/A480M, Type 304 or 316, as indicated in "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish is to be No. 2B, No. 2D, No. 3, or No. 4 as indicated in "Duct Schedule" Article.

D. Aluminum Sheets: Comply with ASTM B209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.

E. Reinforcement Shapes and Plates: ASTM A36/A36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

F. Tie Rods: Galvanized steel, 1/4-inch- minimum diameter for lengths 36 inches or less; 3/8-inch- minimum diameter for lengths longer than 36 inches.

2.5 DUCT LINER

A. Fibrous-Glass Duct Liner: Comply with ASTM C1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Certainteed; SAINT-GOBAIN.
b. Johns Manville; a Berkshire Hathaway company.
c. Owens Corning.
d. Or approved equal.

2. Source Limitations: Obtain fibrous-glass duct liner from single manufacturer.

3. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound is to be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
4. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C916.

    a. Adhesive must have a VOC content of 80 g/L or less.
    b. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C534/C534M, Type II, Grade 1; and with NFPA 90A or NFPA 90B.

1. Source Limitations: Obtain flexible elastomeric duct liner from single manufacturer.
2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.
3. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

    a. Adhesive must have a VOC content of 80 g/L or less.
    b. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Fibrous-Glass-Free, Natural-Fiber Duct Liner: Made from partially recycled cotton or polyester products and containing no fiberglass. Airstream surface overlaid with fire-resistant facing to prevent surface erosion by airstream, complying with NFPA 90A or NFPA 90B. Treat natural-fiber products with antimicrobial coating.

1. Source Limitations: Obtain fibrous-glass-free, natural-fiber duct liner from single manufacturer.
2. Maximum Thermal Conductivity: 0.24 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature when tested in accordance with ASTM C518.
3. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested in accordance with ASTM E84; certified by an NRTL.
4. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

    a. Adhesive must have a VOC content of 80 g/L or less.
    b. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Insulation Pins and Washers:

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick ; with beveled edge sized as required to hold insulation securely in place, but not less than 1-1/2 inches in diameter.

2.6 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets are to be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.

B. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10 inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

C. Flanged Joint Sealant: Comply with ASTM C920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.

2.7 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Galvanized-steel rods and nuts.

B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

C. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A603.

D. Steel Cables for Stainless Steel Ducts: Stainless steel complying with ASTM A492.

E. Steel Cable End Connections: Galvanized-steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

F. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

G. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless Steel Ducts: Stainless steel shapes and plates.

3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and coordination drawings.

B. Install ducts in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install ducts in maximum practical lengths with fewest possible joints.

D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

J. Install fire and smoke dampers where indicated on Drawings and as required by the NYC Building Code. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers and specific installation requirements of the damper UL listing.

K. Install heating coils, cooling coils, air filters, dampers, and all other duct-mounted accessories in air ducts where indicated on Drawings.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials both before and after installation. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

M. Elbows: Use long-radius elbows wherever they fit.

1. Fabricate 90-degree rectangular mitered elbows to include turning vanes.
2. Fabricate 90-degree round elbows with a minimum of three segments for 12 inches and smaller and a minimum of five segments for 14 inches and larger.

N. Branch Connections: Use lateral or conical branch connections.

3.3 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.4 DUCTWORK EXPOSED TO WEATHER

A. All external joints are to have secure watertight mechanical connections. Seal all openings to provide weatherproof construction.

B. Construct ductwork to resist external loads of wind, snow, ice, and other effects of weather. Provide necessary supporting structures.

C. Single Wall:

1. Ductwork is to be Type 316 stainless steel.
2. Ductwork is to be galvanized steel.
3. Where ducts have external insulation, provide weatherproof aluminum jacket. See Section 230713 "Duct Insulation."

3.5 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts at a minimum to the following seal classes in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class A.
4. Outdoor, Return-Air Ducts: Seal Class A.

5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class A.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class A.
8. Unconditioned Space, Return-Air Ducts: Seal Class A.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class A.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
11. Conditioned Space, Exhaust Ducts: Seal Class A.
12. Conditioned Space, Return-Air Ducts: Seal Class A.

C. All exposed ductwork must be sealed such that the sealant is not visible from the exterior of the ductwork. Concealed sealant methods, clear sealant, or flanged connections must be used.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.7 DUCTWORK CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.8 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099123 "Interior Painting."

B. Exposed ductwork must have exterior surface prepared as required to accommodate painting as directed by Commissioner. Color and finish to be determined by Commissioner.

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:

a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections, selected by Commissioner from sections installed, totaling no less than 25 percent of total installed duct area for each designated pressure class.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.10 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.

B. Use duct cleaning methodology as indicated in NADCA ACR.

C. Use service openings for entry and inspection.

1. Provide openings with access panels appropriate for duct static-pressure and leakage class at dampers, coils, and any other locations where required for inspection and cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

D. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

E. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.

3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

F. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans in accordance with NADCA ACR. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents in accordance with manufacturer's written instructions after removal of surface deposits and debris.

3.11 STARTUP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

END OF SECTION 233113

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Manual volume dampers.
3. Fire dampers.
4. Turning vanes.
5. Remote damper operators.
6. Duct-mounted access doors.
7. Flexible connectors.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For duct silencers, include pressure drop, dynamic insertion loss, and self-generated noise data. Include breakout noise calculations for high-transmission-loss casings.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 90A and NFPA 90B.

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials must be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 BACKDRAFT AND PRESSURE RELIEF DAMPERS

A. Product: Subject to compliance with requirements, provide one of the following:

1. Cesco Products; a division of MESTEK, Inc.
2. Greenheck Fan Corporation.
3. Lloyd Industries, Inc.
4. Nailor Industries Inc.
5. Ruskin Company.
6. Or approved equal.

B. Description: Gravity balanced.

C. Performance:

1. AMCA Certification: Test and rate in accordance with AMCA 511.
2. Leakage:

a. Class IA: Leakage must not exceed 3 cfm/sq. ft. against 1-inch wg differential static pressure.

D. Return Spring: Adjustable tension.

E. Damper Actuator - Electric:

1. Electric - 24 V ac.
2. Two position.

a. Sufficient motor torque and spring torque to drive damper fully closed with adequate force to achieve required damper seal.

3. Clockwise or counterclockwise drive rotation as required for application.
4. Environmental Operating Range:

a. Temperature: Minus 40 to plus 130 deg F.
b. Humidity: 5 to 95 percent relative humidity noncondensing.

5. Environmental Enclosure: NEMA 2.
6. Actuator to be factory mounted and provided with a single-point wiring connection.

F. Controllers, Electrical Devices, and Wiring:

1. Comply with requirements for electrical devices and connections specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."

G. Accessories:

1. Adjustment device to permit setting for varying differential static pressure.
2. Counterweights and spring-assist kits for vertical airflow installations.
3. 90-degree stops.

2.3 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Greenheck Fan Corporation.
   b. Lloyd Industries, Inc.
   c. Nailor Industries Inc.
   d. Pottorff.
   e. Ruskin Company.
   f. Or approved equal.

2. Performance:

   a. Leakage Rating Class III: Leakage not exceeding 40 cfm/sq. ft. against 1-inch wg differential static pressure.

3. Construction:

   a. Suitable for horizontal or vertical airflow applications.

4. Blades:

   a. Multiple or single blade.
   b. Parallel- or opposed-blade design.
   c. Stiffen damper blades for stability.
   d. Galvanized Stainless steel; 16 gauge thick.

5. Blade Axles: Galvanized steel.
6. Bearings:

   a. Dampers mounted with vertical blades to have thrust bearing at each end of every blade.

7. Tie Bars and Brackets: Galvanized steel.
8. Locking device to hold damper blades in a fixed position without vibration.

B. Low-Leakage, Steel, Manual Volume Dampers:

1. Product: Subject to compliance with requirements, provide one of the following:

    a. Greenheck Fan Corporation.
    b. Lloyd Industries, Inc.
    c. Nailor Industries Inc.
    d. Pottorff.
    e. Ruskin Company.
    f. Or approved equal.

2. Performance:

    a. AMCA Certification: Test and rate in accordance with AMCA 511.
    b. Leakage:

        1) Class IA: Leakage must not exceed 3 cfm/sq. ft. against 1-inch wg differential static pressure.

3. Construction:

    a. Suitable for horizontal or vertical airflow applications.

4. Blades:

    a. Multiple or single blade.
    b. Parallel- or opposed-blade design.
    c. Stiffen damper blades for stability.
    d. Galvanized, roll-formed steel; 16 gauge thick.

5. Bearings:

    a. Dampers mounted with vertical blades to have thrust bearing at each end of every blade.

6. Locking device to hold damper blades in a fixed position without vibration.

C. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle, made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.4 FIRE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Arrow United Industries.
2. Greenheck Fan Corporation.
3. Pottorff.
4. Ruskin Company.
5. Or approved equal.

B. Type: dynamic; rated and labeled in accordance with UL 555 by an NRTL.

C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 3000 fpm velocity.

D. Fire Rating: 1-1/2 hours.

E. Frame: Curtain type with blades outside airstream Curtain type with blades outside airstream except when located behind grille where blades may be inside airstream; fabricated with roll-formed galvanized steel; with mitered and interlocking corners; gauge in accordance with UL listing.

F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel; gauge in accordance with UL listing.

G. Mounting Orientation: Vertical or horizontal as indicated.

H. Blades: Roll-formed galvanized sheet steel, . Material gauge is to be in accordance with UL listing.

I. Horizontal Dampers: Include blade lock and stainless steel closure spring.

J. Heat-Responsive Device:

1. Replaceable, 165 deg F rated, fusible links.

2.5 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aero-Dyne Sound Control Co.
2. Ductmate Industries, Inc.
3. Duro Dyne Inc.
4. DynAir; a Carlisle Company.
5. Or approved equal.

B. Manufactured Turning Vanes for Metal Ducts: Fabricate curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

D. Vane Construction:

1. Double wall.

2.6 REMOTE DAMPER OPERATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. DynAir; a Carlisle Company.
2. Young Regulator Company.

3. Titus.
4. Or approved equal.

B. Description: Cable system designed for remote manual damper adjustment.

C. Cable: Steel.

2.7 DUCT-MOUNTED ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Arrow United Industries.
2. Ductmate Industries, Inc.
3. Duro Dyne Inc.
4. Ruskin Company.
5. Or approved equal.

B. Duct-Mounted Access Doors: Fabricate access panels in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figure 7-2 (7-2M), "Duct Access Doors and Panels," and Figure 7-3, "Access Doors - Round Duct."

1. Door:

a. Double wall, rectangular.
b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
c. 24-gauge- thick galvanized steel door panel.
d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
e. Fabricate doors airtight and suitable for duct pressure class.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.

a. 24-gauge- thick galvanized steel or 0.032-inch- thick aluminum frame.

3. Number of Hinges and Locks:

a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
b. Access Doors up to 18 Inches Square: Continuous and two sash locks.
c. Access Doors up to 24 by 48 Inches: Continuous and two compression latches.

2.8 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. DynAir; a Carlisle Company.
4. Or approved equal.

B. Fire-Performance Characteristics: Adhesives, sealants, fabric materials, and accessory materials must have flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested in accordance with ASTM E84.

C. Airstream Surfaces: Surfaces in contact with the airstream must comply with requirements in ASHRAE 62.1.

D. Materials: Flame-retardant or noncombustible fabrics.

E. Coatings and Adhesives: Comply with UL 181, Class 1.

F. Metal-Edged Connectors: Factory fabricated with a fabric strip wide attached to two strips of 2-3/4-inch-wide, thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.

G. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

H. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd..
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F.

2.9 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A653/A653M.

1. Exposed-Surface Finish: Mill phosphatized.

B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless steel ducts.

C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Install duct accessories in accordance with applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116 for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless steel accessories in stainless steel ducts, and aluminum accessories in aluminum ducts.

C. Where multiple damper sections are necessary to achieve required dimensions, provide reinforcement to fully support damper assembly when fully closed at full system design static pressure.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated and as needed for testing and balancing.

G. Install firedampers in accordance with UL listing.

H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct coils.
2. Upstream from duct filters.
3. At outdoor-air intakes and mixed-air plenums.
4. At drain pans and seals.
5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links must be pressure relief access doors and must be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
7. Upstream from turning vanes.
8. Control devices requiring inspection.
9. Elsewhere as indicated.

I. Install access doors with swing against duct static pressure.

J. Access Door Sizes:

1. Two-Hand Access: 12 by 6 inches.
2. Head and Hand Access: 18 by 10 inches.
3. Head and Shoulders Access: 21 by 14 inches.
4. Body Access: 25 by 14 inches.
5. Body plus Ladder Access: 25 by 17 inches.

K. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

L. Install flexible connectors to connect ducts to equipment.

M. For fans developing static pressures of 5 inches wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

N. Install duct test holes where required for testing and balancing purposes.

END OF SECTION 233300

SECTION 233416 - CENTRIFUGAL HVAC FANS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Square in-line centrifugal fans.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes for fans.
2. Rated capacities, operating characteristics, and furnished specialties and accessories.
3. Certified fan performance curves with system operating conditions indicated.
4. Certified fan sound-power ratings.
5. Motor ratings and electrical characteristics, plus motor and electrical accessories.
6. Material thickness and finishes, including color charts.
7. Dampers, including housings, linkages, and operators.
8. Fan speed controllers.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For centrifugal fans to include in normal operation, emergency operation, and maintenance manuals with replacement parts listing.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of the centrifugal fans that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 1 year parts from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of unit components.

C. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Startup."

D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

2.2 SQUARE IN-LINE CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carnes Company.
2. Greenheck Fan Corporation.
3. Loren Cook Company.
4. PennBarry.
5. Or approved equal.

B. Description: Square in-line centrifugal fans.

C. Housing:

1. Housing Material: Aluminum or Stainless steel.
2. Housing Coating: None.
3. Housing Construction: Side panels must be easily removable for service. Include inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.

D. Direct-Drive Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing; with wheel, inlet cone, and motor on swing-out service door.

E. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosures around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.

F. Fan Wheels: Aluminum airfoil blades welded to aluminum hub.

G. Motor Enclosure: Open, dripproof .

H. Accessories:

1. Access for Inspection, Cleaning, and Maintenance: Comply with requirements in ASHRAE 62.1.
2. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
3. Volume-Control Damper: Manually operated with quadrant lock, located in fan outlet.
4. Companion Flanges: For inlet and outlet duct connections.
5. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.
6. Side Discharge: Flange connector and attachment hardware to provide right-angle discharge on side of unit.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION, GENERAL

A. Install centrifugal fans level and plumb.

B. Lift and support units with manufacturer's designated lifting or supporting points.

C. Equipment Mounting:

1. Support duct-mounted and other hanging centrifugal fans directly from the building structure, using suitable hanging systems as specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
2. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

D. Install units with clearances for service and maintenance.

E. Label fans according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.3 DUCTWORK AND PIPING CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

B. Install ducts adjacent to fans to allow service and maintenance.

3.4 ELECTRICAL CONNECTIONS

A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

3.5 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

3.6 ADJUSTING

A. Adjust belt tension.

B. Lubricate bearings.

C. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.7 CLEANING

A. After completing system installation and testing, adjusting, and balancing and after completing startup service, clean fans internally to remove foreign material and construction dirt and dust.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections with the assistance of a factory-authorized service representative.

B. Tests and Inspections:

1. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Fans and components will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 233416

SECTION 233423 - HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Ceiling-mounted ventilators.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes for fans.
2. Rated capacities, operating characteristics, and furnished specialties and accessories.
3. Certified fan performance curves with system operating conditions indicated.
4. Certified fan sound-power ratings.
5. Motor ratings and electrical characteristics, plus motor and electrical accessories.
6. Material thickness and finishes, including color charts.
7. Dampers, including housings, linkages, and operators.
8. Prefabricated roof curbs.
9. Fan speed controllers.

B. Shop Drawings:

1. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For HVAC power ventilators to include in normal and emergency operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 WARRANTY

A. Warranty: Manufacturer agrees to replace components of HVAC power ventilators that fail in materials or workmanship within specified warranty period.
   1. Warranty Period for parts: 1 year from date of Substantial Completion..

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of unit components.

C. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

2.2 CEILING-MOUNTED VENTILATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   1. Greenheck Fan Corporation.
   2. Loren Cook Company.
   3. PennBarry.
   4. Or approved equal.

B. Housing: Steel, lined with acoustical insulation.

C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel removable for service.

D. Back-draft damper: Integral.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Accessories:

1. Variable-Frequency Motor Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.
3. Isolation: Rubber-in-shear vibration isolators.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION, GENERAL

A. Install power ventilators level and plumb.

B. Equipment Mounting:

1. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

C. Install units with clearances for service and maintenance.

D. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.3 DUCTWORK CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

3.4 ELECTRICAL CONNECTIONS

A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

3.5 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

3.6 ADJUSTING

A. Adjust belt tension.

B. Lubricate bearings.

C. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.7 CLEANING

A. After completing system installation and testing, adjusting, and balancing and after completing startup service, clean fans internally to remove foreign material and construction dirt and dust.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections with the assistance of a factory-authorized service representative.

B. Tests and inspections:

1. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Test and adjust controls and safeties.
3. Fans and components will be considered defective if they do not pass tests and inspections.
4. Prepare test and inspection reports.

END OF SECTION 233423

SECTION 233600 - AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Modulating, single-duct air terminal units.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of air terminal unit.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for air terminal units.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
3. Product data showing compliance with ASHRAE 62.1.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 WARRANTY

A. Warranty: Manufacturer agrees to replace components of air terminal units that fail in materials or workmanship within specified warranty period.
1. Warranty Period for parts: 1 year from date of Substantial Completion..

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a Qualified Electrical Testing Laboratory, and marked for intended location and application.

B. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment," and Section 7 - "Construction and System Start-up."

C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, "Section 6 - Heating, Ventilating, and Air Conditioning."

2.2 MODULATING, SINGLE-DUCT AIR TERMINAL UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anemostat Products; a Mestek company.
2. Nailor Industries Inc.
3. Titus, a division of Air System Components; Johnson Controls, Inc.
4. Trane.
5. Tuttle & Bailey, a division of Air System Components; Johnson Controls, Inc.
6. Or approved equal.

B. Description: Volume-damper assembly inside unit casing with control components inside a protective metal shroud.

C. Casing: Minimum 20-gauge- thick galvanized steel.

1. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
2. Air Outlet: S-slip and drive connections, size matching inlet size.
3. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.

D. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.

1. Maximum Damper Leakage: AHRI 880 rated, 1 percent of nominal airflow at 3-inch wg inlet static pressure.

E. Velocity Sensors: Multipoint array with velocity inlet sensors.

F. Attenuator Section: Casing material and thickness matching associated air terminal unit casing. Provide absorptive attenuator integral with the air terminal unit, with noise transmission loss performance as required in schedules on Drawings.

G. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless steel, machine-staked terminals secured with stainless steel hardware. Provide electric-resistance heating coils for air terminal units scheduled on Drawings.

H. Electric Controls:

1. Electric Damper Actuator: 24 V, spring-return open spring-return closed fail in last position.
2. Electric Thermostat: Wall-mounted electronic type with clock display, temperature display in Fahrenheit and Celsius, and space temperature set point.
3. Air Volume Controls: Pressure-dependent volume controls with field-adjustable minimum and maximum position stops.

I. Electronic Controls:

1. Electronic Damper Actuator: 24 V, spring-return open spring-return closed capacitor-discharge-return open capacitor-discharge-return closed fail in last position.
2. Electronic Thermostat: Wall-mounted electronic type with temperature set-point display in Fahrenheit and Celsius.
3. Electronic Air Volume Controller: Pressure-independent analog electronic controller, factory calibrated and field adjustable to minimum and maximum air volumes; provides consistent airflow to the space in response to electronic thermostat signal while compensating for inlet static-pressure variations of up to 4 inches wg; includes a multipoint velocity sensor at air inlet.

J. Direct Digital Controls:

1. Terminal Unit Controller: Pressure-independent, VAV controller and integrated actuator, and electronic airflow transducer with multipoint velocity sensor at air inlet, factory calibrated to minimum and maximum air volumes.

   a. Occupied and unoccupied operating mode.
   b. Remote reset of airflow or temperature set points.
   c. Adjusting and monitoring with portable terminal.
   d. Communication with temperature-control system specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."

2. Room Sensor: Wall mounted with access for connection of portable operator terminal.

K. Control Sequence: See Section 230993.11 "Sequence of Operation for HVAC" for control sequences.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION, GENERAL

A. Comply with Section 230529 "Hangers and Supports for HVAC Piping and Equipment" and Section 233113 "Metal Ducts" for hangers and supports.

B. Install air terminal units according to NFPA 90A.

C. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.

3.3 DUCTWORK CONNECTIONS

A. Comply with requirements in Section 233113 "Metal Ducts" for connecting ducts to air terminal units.

B. Make connections to air terminal units with flexible connectors complying with requirements in Section 233300 "Air Duct Accessories."

3.4 ELECTRICAL CONNECTIONS

A. Install field power to each air terminal unit electrical power connection. Coordinate with air terminal unit manufacturer and installers.

B. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

D. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

E. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

3.5 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

3.6 IDENTIFICATION

A. Label each air terminal unit with drawing designation, nominal airflow, maximum and minimum factory-set airflows. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for equipment labels and warning signs and labels.

3.7 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's written instructions.

2. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
3. Verify that controls and control enclosure are accessible.
4. Verify that control connections are complete.
5. Verify that nameplate and identification tag are visible.
6. Verify that controls respond to inputs as specified.

3.8 ADJUSTING

A. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for air terminal unit testing, adjusting, and balancing.

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections with the assistance of a factory-authorized service representative.

B. Tests and inspections:

1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Air terminal unit will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 233600

SECTION 233713.13 - AIR DIFFUSERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Rectangular and square ceiling diffusers.
2. Linear bar diffusers.
3. Ceiling-integral continuous slot diffusers.
4. High-capacity drum louver diffusers.

B. Related Requirements:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers.
2. Section 233713.23 "Air Registers and Grilles" for adjustable-bar register and grilles, fixed-face registers and grilles, and linear bar grilles.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 RECTANGULAR AND SQUARE CEILING DIFFUSERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anemostat Products; a Mestek company.
2. Nailor Industries Inc.
3. Price Industries.
4. Titus.
5. Or approved equal.

B. Devices must be specifically designed for variable-air-volume flows.

C. Material: Aluminum.

D. Finish: Baked enamel, color selected by Commissioner.

2.2 LINEAR BAR DIFFUSERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anemostat Products; a Mestek company.
2. Price Industries.
3. Titus.
4. Or approved equal.

B. Devices must be specifically designed for variable-air-volume flows.

C. Material: Aluminum.

D. Finish: Baked enamel, color selected by Commissioner.

2.3 HIGH-CAPACITY DRUM LOUVER DIFFUSERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anemostat Products; a Mestek company.
2. Price Industries.
3. Titus.
4. Or approved equal.

B. Airflow Principle: Extended distance for high airflow rates.

C. Material: Aluminum, heavy gage extruded.

D. Gasket between drum and border.

E. Blades: Individually adjustable horizontally.

F. Accessories:

1. Duct-mounting collars with countersunk screw holes.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas where diffusers are installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install diffusers level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Commissioner for a determination of final location.

C. Install diffusers with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.4 ADJUSTING

A. After installation, adjust diffusers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713.13

SECTION 233713.23 - AIR REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Adjustable blade face registers and grilles.
2. Fixed face registers and grilles.
3. Linear bar grilles.

B. Related Requirements:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to registers and grilles.
2. Section 233713.13 "Air Diffusers" for various types of air diffusers.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Register and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 REGISTERS

A. Adjustable Blade Face Register :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anemostat Products; a Mestek company.
b. Price Industries.
c. Titus.
d. Or approved equal.

B. Fixed Face Register :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anemostat Products; a Mestek company.
b. Price Industries.
c. Titus.
d. Or approved equal.

2.2 GRILLES

A. Adjustable Blade Face Grille :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anemostat Products; a Mestek company.
b. Price Industries.
c. Titus.
d. Or approved equal.

B. Fixed Face Grille :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anemostat Products; a Mestek company.
b. Price Industries.
c. Titus.
d. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas where registers and grilles are installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install registers and grilles level and plumb.

B. Outlets and Inlets Locations: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Commissioner for a determination of final location.

C. Install registers and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.4 ADJUSTING

A. After installation, adjust registers and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713.23

SECTION 237223.23 - PACKAGED, OUTDOOR, HEAT WHEEL ENERGY RECOVERY UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Packaged, outdoor, heat wheel, energy-recovery units.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include packaged, outdoor, heat-wheel, energy-recovery-unit rated capacities, operating characteristics, furnished specialties, and accessories.
2. Fans:

   a. Certified fan-performance curves with system operating conditions indicated.
   b. Certified fan-sound power ratings.
   c. Fan construction and accessories.
   d. Motor ratings, electrical characteristics, and motor accessories.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.
2. Laboratory Test Reports: For antimicrobial coatings, indicating compliance with requirements for low-emitting materials.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For packaged, outdoor, heat-wheel, energy-recovery equipment to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 COORDINATION

A. Coordinate sizes and locations of building openings and duct connections with actual equipment provided.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of packaged, outdoor, heat-wheel, energy-recovery units that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Packaged Energy-Recovery Units: 1 year parts from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of air-handling units and components.

B. ASHRAE Compliance:

1. Applicable requirements in ASHRAE 62.1.
2. Capacity ratings for heat-wheel, energy-recovery equipment: Comply with ASHRAE 84.

C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1.

D. UL Compliance:

1. Packaged Heat-Recovery Ventilators: Comply with requirements in UL 1815 or UL 1812.
2. Electric Coils: Comply with requirements in UL 1995.

E. Comply with ASTM E84 or UL 723.

2.2 PACKAGED, OUTDOOR, HEAT-WHEEL, ENERGY-RECOVERY UNITS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Semco or comparable product by one of the following:

1. Greenheck Fan Corporation.
2. YORK; a Johnson Controls company.
3. Daikin Applied.
4. Or approved equal.

B. Source Limitations: Obtain packaged, outdoor, heat-wheel, energy-recovery units from single manufacturer.

C. Surfaces in Contact with Airstream: Comply with requirements in ASHRAE 62.1.

D. Housing: Manufacturer's standard construction with corrosion-protection coating and exterior finish, gasketed hinged access doors or removable panels with neoprene gaskets for inspection and access to internal parts, minimum 1 inch thick, thermal insulation, knockouts for electrical connections, exterior drain connection, and lifting lugs.

E. Heat Wheel:

1. Casing:

a. Manufacturer's standard construction with standard factory finish.
b. Slide-in, slide-out cassette style.
c. Provide casing seals on periphery of rotor and on duct divider and purge section.
d. Support vertical rotors on grease-lubricated ball bearings having extended grease fittings or permanently lubricated bearings with minimum L-50 of 200,000 hours. Support horizontal rotors on tapered roller bearing.

2. Rotor:

a. Aluminum or polymer segmented wheel, strengthened with radial spokes, with nontoxic, noncorrosive, silica-gel coating.

3. Drive: Electric motor , with speed changed by variable-frequency motor controller and self-adjusting multilink belt around outside of rotor.

a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230500 "Common Work Results for HVAC."
b. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

F. Supply and Exhaust Fans: Centrifugal, backward-inclined fan with spring isolators of 1-inch static deflection.

G. Filters:

1. Description: Cleanable wire mesh at outside air intake and pleated, factory-fabricated, self-supported, disposable air filters with holding frames.
2. UL Compliance: Comply with UL 900.
3. Filter-Mounting Frames: Arranged with access doors or panels on one or both sides of unit. Design unit with filters removable from one side, or lift out from access plenum.

H. Wiring: Fabricate units with space within housing for electrical conduits. Wire motors and controls, so only external connections are required during installation.

1. Outdoor Enclosure: NEMA 250, Type 3R enclosure contains relays, starters, and terminal strip.
2. Include fused disconnect switches.

2.3 CONTROLS

A. Control Panel: Solid-state, programmable, microprocessor-based control unit for wall mounting. Integrate to BACnet, LonWorks, or Modbus, as specified in Section 230923 "Direct Digital Control (DDC) System for HVAC".

B. Starting relay, factory mounted and wired, and manual motor starter for field wiring.

C. Frost Control: Timed exhaust-only operation.

D. Economizer Control, Stop Wheel: Stop wheel rotation or modulate wheel rotation speed when conditions are favorable for economizer operation.

E. Variable-Speed Control:

1. Factory mounted and wired, permitting input of field-connected, 4- to 20-mA or 1- to 10-V control signal.

2.4 SOURCE QUALITY CONTROL

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended application.

B. AHRI Compliance: Capacity ratings for air-to-air energy-recovery equipment certified as complying with AHRI 1060.

C. Fan Performance Rating: Comply with AMCA 211, and label fans with AMCA-certified rating seal. Factory test fan performance for airflow, pressure, power, air density, rotation speed, and efficiency in accordance with AMCA 210 and ASHRAE 51.

D. Fan Sound Rating Comply with AMCA 301 or AHRI 260.

E. UL Compliance:

1. Packaged Heat-Recovery Ventilators: Comply with requirements in UL 1812.
2. Electric Coils: Comply with UL 1995.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine casing insulation materials and filter media before packaged, outdoor, heat wheel energy-recovery unit installation. Replace insulation materials and filter media that are wet, moisture damaged, or mold contaminated.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF PACKAGED, OUTDOOR, HEAT-WHEEL, ENERGY-RECOVERY UNITS

A. Install packaged, outdoor, heat-wheel, energy-recovery units, so supply and exhaust airstreams flow in opposite directions, and rotation is away from exhaust side to purge section to supply side.

1. Install access doors in both supply and exhaust ducts, both upstream and downstream, for access to wheel surfaces, drive motor, and seals.
2. Install removable panels or access doors between supply and exhaust ducts on building side for bypass during startup.
3. Access doors and panels are specified in Section 233300 "Air Duct Accessories."

B. Equipment Mounting:

1. Install roof-mounted packaged, outdoor, heat-wheel, energy-recovery units on manufacturer's-recommended-height equipment roof curbs. Comply with requirements for equipment curbs specified in Section 077200 "Roof Accessories."
2. Comply with requirements for vibration-isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

C. Install units with clearances for service and maintenance.

D. Do not operate equipment fans until temporary or permanent filters are in place. Replace temporary filters used during construction and testing with new, clean filters prior to final inspection.

3.4 DUCTWORK CONNECTIONS

A. Comply with requirements for ductwork in accordance with Section 233113 "Metal Ducts."

B. Connect duct to units with flexible connections. Comply with requirements in Section 233300 "Air Duct Accessories."

C. Isolation Dampers: Install isolation dampers in accordance with Section 230923.12 "Control Dampers."

3.5 PIPING CONNECTIONS

A. Where installing piping adjacent to unit, allow service and maintenance.

B. Connect piping to units mounted on vibration isolators with flexible connectors.

3.6 ELECTRICAL CONNECTIONS

A. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

B. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate is to be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate is to be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.7 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

3.8 STARTUP SERVICE

A. Engage factory-authorized service representative to perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's written instructions.

3.9 ADJUSTING

A. Adjust moving parts to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust initial temperature and humidity set points.

C. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Packaged, outdoor, heat-wheel, energy-recovery equipment will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.11 DEMONSTRATION

A. Instruct City of New York's personnel to adjust and operate air-to-air energy-recovery units.

END OF SECTION 237223.23

SECTION 237416.13 - PACKAGED, LARGE-CAPACITY, ROOFTOP AIR-CONDITIONING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Packaged, large-capacity, rooftop air conditioning units.

1.3 DEFINITIONS

A. RTU: Rooftop unit. As used in this Section, this abbreviation means packaged, large-capacity, rooftop air-conditioning units. This abbreviation is used regardless of whether the unit is mounted on the roof or on a concrete base on ground.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each RTU.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.
3. Include unit dimensions and weight.
4. Include cabinet material, metal thickness, finishes, insulation, and accessories.
5. Fans:

    a. Include certified fan-performance curves with system operating conditions indicated.
    b. Include certified fan-sound power ratings.
    c. Include fan construction and accessories.
    d. Include motor ratings, electrical characteristics, and motor accessories.

6. Include certified coil-performance ratings with system operating conditions indicated.
7. Include filters with performance characteristics.
8. Include gas furnaces with performance characteristics.

9. Include factory selection calculations for each antimicrobial ultraviolet lamp installation.
10. Include dampers, including housings, linkages, and operators.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.
2. Product Data: For air filtration performance.
3. Product Data: For adhesives, mastics, and sealants, indicating VOC content.
4. Laboratory Test Reports: For adhesives, mastics, and sealants, indicating compliance with requirements for low-emitting materials.
5. Product Data: For energy performance.
6. Refrigerant: Product Data for refrigerants, indicating compliance with refrigerant management practices.

C. Coordination Drawings: Floor plans and other details, or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.

1.6 INFORMATIONAL SUBMITTALS

A. System startup reports.

B. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For RTUs to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of outdoor, semi-custom, air-handling unit that fail in materials or workmanship within specified warranty period.

1. Warranty Period:1 year parts and 5 years compressor from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of RTUs and components.

C. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

D. ASHRAE 15 Compliance: For refrigeration system safety.

E. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

F. UL Compliance: Comply with UL 1995.

2.2 PACKAGED, LARGE-CAPACITY, ROOFTOP AIR-CONDITIONING UNITS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Xetex or comparable product by one of the following:

1. Addison.
2. Nortek; brand of Mammoth.
3. Or approved equal.

B. Unit Casings:

1. General Fabrication Requirements for Casings: Formed and reinforced double-wall insulated panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.
2. Airstream Surfaces: Surfaces in contact with airstream must comply with requirements in ASHRAE 62.1.
3. Static-Pressure Classifications:

a. For Unit Sections Upstream of Fans: Minus 3-inch wg.
b. For Unit Sections Downstream and Including Fans: 4-inch wg.

4. Panels and Doors:

a. Panels:

1) Fabrication: Formed and reinforced with same materials and insulation thickness as casing.
2) Fasteners: Two or more camlock type for panel lift-out operation. Arrangement must allow panels to be opened against air-pressure differential.
3) Gasket: Neoprene, applied around entire perimeters of panel frames.
4) Size: Large enough to allow inspection and maintenance of air-handling unit's internal components. Dimensions to be at least 24 inches wide by full height of unit casing up to a maximum height of 60 inches.

b. Access Doors:

1) Hinges: A minimum of two ball-bearing hinges or stainless steel piano hinge and two wedge-lever-type latches, operable from inside and outside. Arrange doors to be opened against air-pressure differential.

2) Gasket: Neoprene, applied around entire perimeters of panel frames.
3) Size: Large enough to allow inspection and maintenance of air-handling unit's internal components. Dimensions to be at least 24 inches wide by full height of unit casing up to a maximum height of 60 inches.

c. Locations and Applications:

1) Fan Section: Doors and inspection and access panels.
2) Access Section: Doors.
3) Coil Section: Inspection and access panels.
4) Damper Section: Doors.
5) Filter Section: Doors large enough to allow periodic removal and installation of filters.
6) Mixing Section: Doors.

5. Condensate Drain Pans:

a. Location: Each type of cooling coil and rotary heat exchanger.
b. Construction:

1) Single-wall, galvanized-steel or noncorrosive polymer or stainless steel sheet.

c. Drain Connection:

1) Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on both ends of pan.
2) Minimum Connection Size: NPS 1.

d. Slope: Minimum 0.125-in./ft. slope, to comply with ASHRAE 62.1, in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and from humidifiers and to direct water toward drain connection.
e. Length: Extend drain pan downstream from leaving face for distance to comply with ASHRAE 62.1.
f. Width: Entire width of water producing device.
g. Depth: A minimum of 2 inches deep.
h. Pan-Top Surface Coating for Galvanized-Steel Drain Pans: Asphaltic waterproofing compound.
i. Units with stacked coils must have an intermediate drain pan to collect condensate from top coil.

C. Fans, Drives, and Motors:

1. Fan and Drive Assemblies: Statically and dynamically balanced and designed for continuous operation at maximum-rated fan speed and motor horsepower.
2. Supply-Air Fans: Centrifugal, rated according to AMCA 210; galvanized or painted steel; mounted on solid-steel shaft.

a. Shafts: With field-adjustable alignment.

1) Turned, ground, and polished hot-rolled steel with keyway.

b. Housings: Formed- and reinforced-steel panels to form curved scroll housings with shaped cutoff and spun-metal inlet bell.

1) Bracing: Steel angle or channel supports for mounting and supporting fan scroll, wheel, motor, and accessories.

c. Centrifugal Fan Wheels: Inlet flange, backplate, and shallow blades with inlet and tip curved forward in direction of airflow and mechanically fastened to flange and backplate; steel or aluminum hub swaged to backplate and fastened to shaft with setscrews.
d. Mounting: For internal vibration isolation. Factory-mount fans with manufacturer's standard vibration isolation mounting devices having a minimum static deflection of 2.
e. Shaft Lubrication Lines: Extended to a location outside the casing.
f. Flexible Connector: Factory fabricated with a fabric strip minimum 3-1/2 inches wide, attached to two strips of minimum 2-3/4-inch-wide by 0.028-inch- thick, galvanized-steel sheet.

1) Flexible Connector Fabric: Glass fabric, double coated with neoprene. Fabrics, coatings, and adhesives must comply with UL 181, Class 1.

3. Drives, Direct: Factory-mounted, direct drive.
4. Condenser-Coil Fan: Variable-speed propeller, mounted on shaft of permanently lubricated ECM motors.
5. Relief-Air Fan: Backward inclined, shaft mounted on permanently lubricated motor.
6. Motors:

a. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230500 "Common Work Results for HVAC."
b. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
c. Enclosure Type: Open, dripproof.
d. Enclosure Materials: Cast iron.
e. Efficiency: Premium efficient as defined in NEMA MG 1.
f. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.

D. Rotary Heat Exchangers:

1. Casing:

a. Galvanized steel, stainless steel, or aluminum with manufacturer's standard factory finish.
b. Integral purge section limiting carryover of exhaust air to between 0.05 percent at 1.6-inch wg and 0.20 percent at 4-inch wg differential pressure.
c. Casing seals on periphery of rotor, on duct divider, and on purge section.
d. Support vertical rotors on grease-lubricated ball bearings with extended grease fittings. Mount horizontal rotors on tapered roller bearing.

2. Rotor - Aluminum or Polymer: Segmented wheel, strengthened with radial spokes, with nontoxic, noncorrosive, silica-gel desiccant coating.
3. Drive: Fractional horsepower motor and gear reducer, with speed changed by variable-frequency controller. Permanently lubricated wheel bearings with an L-10 400,000 hours.

4. Controls:

    a. Starting relay, factory mounted and wired, and manual motor starter for field wiring.
    b. Variable-frequency controller, factory mounted and wired, permitting input of field connected 4- to 20-mA or 1- to 10-V control signal.
    c. Control energy recovery to permit air economizer operation.
    d. Pilot-Light Indicator: Display rotor rotation and speed.
    e. Speed Settings: Adjustable settings for maximum and minimum rotor speed limits.

E. Coils:

1. General Requirements for Coils:

    a. Comply with AHRI 410.
    b. Fabricate coils section to allow removal and replacement of coil for maintenance and to allow in-place access for service and maintenance of coil(s).
    c. Coils must not act as structural component of unit.

F. Refrigerant Circuit Components:

1. Compressor: Hermetic, variable speed scroll, mounted on vibration isolators; with internal overcurrent and high-temperature protection, internal pressure relief, and crankcase heater.
2. Refrigeration Specialties:

    a. Refrigerant: R-454B.
    b. Expansion valve with replaceable thermostatic element.
    c. Refrigerant filter/dryer.
    d. Manual-reset high-pressure safety switch.
    e. Automatic-reset low-pressure safety switch.
    f. Minimum off-time relay.
    g. Automatic-reset compressor motor thermal overload.
    h. Brass service valves installed in compressor suction and liquid lines.
    i. Low-ambient kit high-pressure sensor.

G. Air Filtration:

1. Panel Filters:

    a. Description: Pleated factory-fabricated, self-supported, disposable air filters with holding frames.
    b. Filter Unit Class: UL 900.
    c. Media: Interlaced glass, synthetic or cotton fibers coated with nonflammable adhesive and antimicrobial coating.

2. Adhesive, Sustainability Projects: As recommended by air-filter manufacturer and with a VOC content of 80 g/L or less.

H. Antimicrobial Ultraviolet Lamp System:

1. Description:

a. UV-C lamp system consisting of power supply, power supply housing, wiring, UV lamp(s), lamp plug, lamp plug protector, encapsulated lamp, and lamp holder used for UV germicidal irradiation of cooling coil and condensate drain pan.
b. Factory installed and preengineered.

2. Standard: UL Category Code ABQK, HVAC accessories, air-duct mounted.
3. Lamps: High output, hot cathode.
4. Lamp-Holder Construction:

a. UV- and moisture-resistant materials and designed to connect the lamp to the plug.
b. Adjustable positioning.

5. Lamp-Clamp Construction:

a. UV- and moisture-resistant materials, water-tight connection.
b. Adjustable positioning.

6. Lamp Protection: Hermetically sealed to provide protection against lamp breakage and to ensure lamp contents from a broken lamp are contained.
7. Lamp Output: UV-C energy, primarily at the 254-nm wavelength with a 360-degree energy distribution.
8. Access Door Interlocks: Automatic disconnect on all access doors into UV-installed casing sections to shield servicing personnel from contact with light.
9. Power Supply: UL-listed, single-point electrical connection with service disconnect.

I. Dampers:

1. Comply with requirements in Section 230923.12 "Control Dampers."
2. Outdoor- and Return-Air Dampers: Low-leakage, double-skin, airfoil-blade, galvanized-steel dampers with compressible jamb seals and extruded-vinyl blade edge seals in parallel-blade arrangement with steel operating rods rotating in sintered bronze or nylon bearings mounted in a single galvanized-steel frame, and with operating rods connected with a common linkage. Leakage rate must not exceed 4 cfm/sq. ft. at 1-inch wg and 8 cfm/sq. ft. at 4-inch wg rated in accordance with AMCA 500D.)
3. Barometric relief dampers.
4. Damper Operators: Comply with requirements in Section 230923.12 "Control Dampers."

J. Electrical Power Connections:

1. RTU is to have a single connection of power to unit with unit-mounted disconnect switch accessible from outside unit and control-circuit transformer with built-in overcurrent protection.

K. Controls:

1. Control equipment is specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."
2. Controller: Direct Digital Control.

a. Controller must have volatile-memory backup.
b. Safety Control Operation:

1) Smoke Detectors: Stop fan and close outdoor-air damper if smoke is detected. Provide additional contacts for alarm interface to fire alarm control panel.
2) Low-Discharge Temperature: Stop fan and close outdoor-air damper if supply air temperature is less than 40 deg F.
3) Defrost Control for Condenser Coil: Pressure differential switch to initiate defrost sequence.

3. Interface Requirements for HVAC Instrumentation and Control System:

a. Interface relay for scheduled operation.
b. Provide BACnet compatible interface for central HVAC control workstation for the following:

1) Adjusting set points.
2) Monitoring supply fan start, stop, and operation.
3) Inquiring data to include outdoor-air damper position, supply- and room-air temperature and humidity.
4) Monitoring occupied and unoccupied operations.
5) Monitoring constant and variable motor loads.
6) Monitoring variable-frequency drive operation.
7) Monitoring cooling load.
8) Monitoring economizer cycles.
9) Monitoring air-distribution static pressure and ventilation air volume.

L. Roof Curbs:

1. Materials: Galvanized steel with corrosion-protection coating, watertight gaskets, and factory-installed wood nailer; complying with NRCA standards.

M. Accessories:

1. Filter differential pressure switch with sensor tubing on either side of filter. Set for final filter pressure loss.
2. Safeties:

a. Condensate overflow switch.

2.3 MATERIALS

A. Steel:

1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for steel sheet.

B. Stainless Steel:

1. Manufacturer's standard grade for casing.
2. Manufacturer's standard type, ASTM A240/A240M for bare steel exposed to airstream or moisture.

C. Galvanized Steel: ASTM A653/A653M.

D. Aluminum: ASTM B209.

E. Comply with Section 230546 "Coatings for HVAC" for corrosion-resistant coating.

2.4 SOURCE QUALITY CONTROL

A. AHRI Compliance:

1. Comply with AHRI 340/360 for testing and rating energy efficiencies for RTUs.
2. Comply with AHRI 210/240 for testing and rating energy efficiencies for RTUs
3. Comply with AHRI 270 for testing and rating sound performance for RTUs.
4. Comply with AHRI 1060 for testing and rating performance for air-to-air exchanger.

B. AMCA Compliance:

1. Comply with AMCA 11 and bear the AMCA-Certified Ratings Seal for air and sound performance according to AMCA 211 and AMCA 311.
2. Damper leakage tested in accordance with AMCA 500-D.
3. Operating Limits: Classify according to AMCA 99.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.

B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.

C. Examine roofs for suitable conditions where RTUs will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF PACKAGED, LARGE-CAPACITY, ROOFTOP AIR-CONDITIONING UNITS

A. Roof Curb: Install on roof structure or concrete base, level and secure, according to NRCA's "NRCA Roofing Manual: Membrane Roof Systems." Install RTUs on curbs and coordinate roof penetrations and flashing with roof construction specified in Section 077200 "Roof Accessories." Secure RTUs to upper curb rail, and secure curb base to roof framing or concrete base with anchor bolts. Coordinate sizes and locations of roof curbs with actual equipment provided.

B. Unit Support: Install unit level on structural curbs. Coordinate wall penetrations and flashing with wall construction. Secure RTUs to structural support with anchor bolts.

C. Equipment Mounting:

1. Install RTUs on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
2. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

3.4 PIPING CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to RTU, allow space for service and maintenance.

C. Connect piping to unit mounted on vibration isolators with flexible connectors.

D. Connect condensate drain pans using , ASTM B88, Type M copper tubing. Extend to nearest equipment or roof drain. Construct deep trap at connection to drain pan and install cleanouts at changes in direction.

3.5 DUCT CONNECTIONS

A. Comply with duct installation requirements specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to termination at top of roof curb.
2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
3. Connect supply ducts to RTUs with flexible duct connectors specified in Section 233300 "Air Duct Accessories."
4. Install return-air duct continuously through roof structure.

3.6 ELECTRICAL CONNECTIONS

A. Connect electrical wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs as specified in Section 260553 "Identification for Electrical Systems."
2. Locate nameplate where easily visible.

3.7 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables"

3.8 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions.

1. Inspect for visible damage to unit casing.
2. Inspect for visible damage to furnace combustion chamber.
3. Inspect for visible damage to compressor, coils, and fans.
4. Inspect internal insulation.
5. Verify that labels are clearly visible.
6. Verify that clearances have been provided for servicing.
7. Verify that controls are connected and operable.
8. Verify that filters are installed.
9. Clean condenser coil and inspect for construction debris.
10. Remove packing from vibration isolators.
11. Inspect operation of barometric relief dampers.
12. Verify lubrication on fan and motor bearings.
13. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
14. Adjust fan belts to proper alignment and tension.
15. Start unit according to manufacturer's written instructions.

    a. Start refrigeration system.
    b. Do not operate below recommended low-ambient temperature.
    c. Complete startup sheets and attach copy with Contractor's startup report.

16. Inspect and record performance of interlocks and protective devices; verify sequences.
17. Operate unit for an initial period as recommended or required by manufacturer.
18. Calibrate thermostats.
19. Adjust and inspect high-temperature limits.
20. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
21. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F above return-air temperature:

    a. Coil leaving-air, dry- and wet-bulb temperatures.
    b. Coil entering-air, dry- and wet-bulb temperatures.
    c. Outdoor-air, dry-bulb temperature.

d. Outdoor-air-coil, discharge-air, dry-bulb temperature.

22. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
23. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.

    a. Supply-air volume.
    b. Return-air volume.
    c. Relief-air volume.
    d. Outdoor-air intake volume.

24. Simulate maximum cooling demand and inspect the following:

    a. Compressor refrigerant suction and hot-gas pressures.
    b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.

25. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:

    a. High-temperature limit on gas-fired heat exchanger.
    b. Low-temperature safety operation.
    c. Filter high-pressure differential alarm.
    d. Economizer to minimum outdoor-air changeover.
    e. Relief-air fan operation.
    f. Smoke and firestat alarms.

26. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.9 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for air-handling system testing, adjusting, and balancing.

C. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.10 CLEANING

A. After completing system installation and testing, adjusting, and balancing RTUs and air-distribution systems and after completing startup service, clean RTUs internally to remove foreign material and construction dirt and dust. Clean fan wheels, cabinets, dampers, coils, and filter housings, and install new, clean filters.

3.11 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. RTU will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.12 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate RTUs.

END OF SECTION 237416.13

SECTION 237433 - DEDICATED OUTDOOR-AIR UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Dedicated outdoor air-handling units.

1.3 DEFINITIONS:

A. ECM: Electronically commutated motor.

B. ISCOP: Integrated Seasonal Coefficient of Performance.

C. ISMRE: Integrated Seasonal Moisture Removal Efficiency.

D. MRC: Moisture Removal Capacity.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each dedicated outdoor-air unit.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
3. Include unit dimensions and weight.
4. Include cabinet material, metal thickness, finishes, insulation, and accessories.
5. Fans:

    a. Certified fan-performance curves with system operating conditions indicated.
    b. Certified fan-sound power ratings.
    c. Fan construction and accessories.
    d. Motor ratings, electrical characteristics, and motor accessories.

6. Include certified coil-performance ratings with system operating conditions indicated.
7. Include filters with performance characteristics.
8. Include heat exchangers with performance characteristics.
9. Include dampers, including housings, linkages, and operators.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.
2. Product Data: For air filtration performance.
3. Product Data: For adhesives, mastics, and sealants, indicating VOC content.
4. Laboratory Test Reports: For adhesives, mastics, and sealants, indicating compliance with requirements for low-emitting materials.
5. Refrigerant: Product Data for refrigerants, indicating compliance with refrigerant management practices.

C. Shop Drawings: For each dedicated outdoor-air unit.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

D. Coordination Drawings: Floor/roof plans and other details, or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.

1.6 INFORMATIONAL SUBMITTALS

A. Source quality-control reports.

B. Startup service reports.

C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For dedicated outdoor-air units to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions, Section 014000 "Quality Requirements."

1.9 WARRANTY

A. Warranty: Manufacturer agrees to replace components of dedicated outdoor-air units that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Compressors: Five years from date of Substantial Completion.

2. Warranty Period for parts: 1 year from date of Substantial Completion..

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an "NRTL" (nationally recognized testing laboratory), and marked for intended location and application.

B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of units and components.

C. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

D. ASHRAE 15 and ASHRAE 34 Compliance: For refrigeration system safety.

E. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

F. ASHRAE 84 Compliance: Comply with capacity ratings for heat-wheel energy-recovery equipment.

G. UL Compliance:

1. Electric Coils: Comply with requirements in UL 1995.

2.2 DEDICATED OUTDOOR-AIR UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AAON.
2. Addison.
3. Munters Corporation.
4. Xetex.
5. Nortek.
6. Or approved equal.

B. Source Limitations: Obtain dedicated outdoor-air units from single manufacturer.

C. Unit Casing:

1. General Fabrication Requirements for Casings: Formed and reinforced double-wall insulated panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.

D. Fans, Drives, And Motors:

1. Fan and Drive Assemblies: Statically and dynamically balanced and designed for continuous operation at maximum-rated fan speed and motor horsepower.

E. Adhesive: As recommended by air-filter manufacturer and with a VOC content of 80 g/L or less.

F. Electrical Power Connections:

1. Single-Point Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other necessary electrical devices must provide a single-point field power connection to unit .
2. Wiring: Numbered and color-coded to match wiring diagram.
3. Wiring Location: Install factory wiring outside an enclosure in a raceway.

G. Intake And Relief Openings:

1. Materials: Match material and finish of casing exterior.

2.3 MATERIALS

A. Steel:

1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for steel sheet.

B. Stainless Steel:

1. Manufacturer's standard grade for casing.
2. Manufacturer's standard type, ASTM A240/A240M for bare steel exposed to airstream or moisture.

C. Galvanized Steel: ASTM A653/A653M.

D. Aluminum: ASTM B209.

2.4 SOURCE QUALITY CONTROL

A. AHRI 920: Manufacturer to certify that performance ratings are in accordance with AHRI 920 if AHRI 920 certification program is not in place. Provide AHRI 920 certification if AHRI 920 certification program is in place.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for piping, ducts, and electrical systems to verify actual locations of connections before equipment installation.

C. Examine roof curbs and equipment supports for suitable conditions where units will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF DEDICATED OUTDOOR-AIR UNITS

A. Unit Support: Install unit level on structural rails. Coordinate roof penetrations and flashing with roof construction. Secure units to structural support with anchor bolts. Coordinate sizes and locations of rails with actual equipment provided.

1. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

B. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing with new, clean filters.

C. Install filter-gauge, static-pressure taps upstream and downstream of filters. Mount filter gauges on outside of filter housing or filter plenum in accessible position. Provide filter gauges on filter banks, installed with separate static-pressure taps upstream and downstream of filters.

D. Connect duct to air-handling units with flexible connections. Comply with requirements in Section 233300 "Air Duct Accessories."

E. Comply with requirements for gas-fired furnace installation in NFPA 54.

F. Install separate devices furnished by manufacturer and not factory installed.

G. Install new filters at completion of equipment installation and before testing, adjusting, and balancing.

3.4 PIPING CONNECTIONS

A. Duct Connections:

1. Comply with requirements in Section 233113 "Metal Ducts."
2. Drawings indicate the general arrangement of ducts.
3. Connect ducts to units with flexible duct connectors. Comply with requirements for flexible duct connectors in Section 233300 "Air Duct Accessories."

3.5 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate must be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.6 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

3.7 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's written instructions.
2. Inspect units for visible damage to refrigerant compressor, condenser and evaporator coils, and fans.
3. Start refrigeration system when outdoor-air temperature is within normal operating limits. and measure and record the following:

   a. Cooling coil leaving-air, dry- and wet-bulb temperatures.
   b. Cooling coil entering-air, dry- and wet-bulb temperatures.
   c. Condenser coil entering-air dry-bulb temperature.
   d. Condenser coil leaving-air dry-bulb temperature.

4. Simulate maximum cooling demand and inspect the following:

   a. Compressor refrigerant suction and hot-gas pressures.
   b. Short-circuiting of air through outside coil or from outside coil to outdoor-air intake.

5. Inspect casing insulation for integrity, moisture content, and adhesion.
6. Verify that clearances have been provided for servicing.
7. Verify that controls are connected and operable.
8. Verify that filters are installed.
9. Clean coils and inspect for construction debris.
10. Verify bearing lubrication.
11. Clean fans and inspect fan-wheel rotation for movement in correct direction without vibration and binding.
12. Adjust fan belts to proper alignment and tension.
13. Start unit.
14. Inspect and record performance of interlocks and protective devices, including response to smoke detectors by fan controls and fire alarm.
15. Operate unit for run-in period.
16. Calibrate controls.
17. Adjust and inspect high-temperature limits.

18. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
19. Verify operational sequence of controls.
20. Measure and record the following airflows. Plot fan volumes on fan curve.

    a. Supply-air volume.
    b. Relief-air flow.
    c. Outdoor-air flow.

B. After startup, change filters, verify bearing lubrication, and adjust belt tension.

C. Remove and replace components that do not properly operate, and repeat startup procedures as specified above.

D. Prepare written report of the results of startup services.

3.8 ADJUSTING

A. Adjust initial temperature and humidity set points.

B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

C. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.9 CLEANING

A. After completing system installation; testing, adjusting, and balancing dedicated outdoor-air unit and air-distribution systems; and completing startup service, clean air-handling units internally to remove foreign material and construction dirt and dust. Clean fan wheels, casings, dampers, coils, and filter housings, and install new, clean filters.

3.10 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Charge refrigerant coils with refrigerant and test for leaks.
2. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

3.11 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate units.

END OF SECTION 237433

SECTION 238129 - VARIABLE-REFRIGERANT-FLOW HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes: VRF HVAC systems.

1. Indoor, concealed, ceiling-mounted units for ducting.
2. Indoor, exposed, wall-mounted units.
3. Indoor, recessed, ceiling-mounted units.
4. Outdoor, air-source heat recovery units.
5. Heat recovery control units (HRCUs).
6. System controls.
7. System refrigerant and oil.
8. System condensate drain piping.
9. System refrigerant piping.
10. Outdoor Equipment stands.
11. Miscellaneous support materials.
12. Piping and tubing insulation.

1.3 DEFINITIONS

A. Air-Conditioning System Operation: System capable of operation with all zones in cooling only.

B. Heat-Pump System Operation: System capable of operation with all zones in either heating or cooling, but not with simultaneous heating and cooling zones that transfer heat between zones.

C. Heat Recovery System Operation: System capable of operation with simultaneous heating and cooling zones that transfer heat between zones.

D. HRCU: Heat Recovery Control Unit. HRCUs are used in heat recovery VRF HVAC systems to manage and control refrigerant between indoor units to provide simultaneous heating and cooling zones. "Heat Recovery Control Unit" is the term used by ASHRAE for what different manufacturers term as branch circuit controller, branch selector box, changeover box, flow selector unit, mode change unit, and other such terms.

E. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

F. Plenum: A space forming part of the air distribution system to which one or more air ducts are connected. An air duct is a passageway, other than a plenum, for transporting air to or from heating, ventilating, or air-conditioning equipment.

G. Three-Pipe System Design: One high pressure refrigerant vapor line, one low pressure refrigerant vapor line, and one refrigerant liquid line connect a single outdoor unit or multiple manifold outdoor units in a single system to associated system HRCUs. One liquid line and refrigerant vapor line connect HRCUs to associated indoor units.

H. Two-Pipe System Design: One refrigerant vapor line and one refrigerant liquid line connect a single outdoor unit or multiple manifold outdoor units in a single system to associated system HRCUs. One refrigerant liquid line and refrigerant vapor line connect HRCUs to associated indoor units. HRCUs used in two pipe systems act as an intermediate heat exchanger and include diverting valves and gas/liquid separators to move high and low pressure refrigerant between indoor units.

I. VRF: Variable refrigerant flow.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For VRF HVAC system components.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for indoor and outdoor units and for HRCUs.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
3. Include operating performance at design conditions and at extreme maximum and minimum outdoor ambient conditions.
4. Include description of system controllers, dimensions, features, control interfaces and connections, power requirements, and connections.
5. Include system operating sequence of operation in narrative form for each unique indoor- and outdoor-unit and HRCU control.
6. Include description of control software features.
7. Include total refrigerant required and a comprehensive breakdown of refrigerant required by each system installed.
8. Include refrigerant type and data sheets showing compliance with requirements indicated.
9. Indicate location and type of service access.

B. Sustainable Design Submittals:

1. Product Data: Indicating compliance with minimum energy performance requirements.
2. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
3. ASHRAE/IES 90.1 compliance.
4. Air-Balance Report: Documentation indicating that Work complies with ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

5. Refrigerant: Product Data for refrigerants, indicating compliance with refrigerant management practices.
6. Product Data for EA Credit "Optimize Energy Performance": Indicating that system meets efficiency requirements.
7. Product Data for EA Credit "Enhanced Refrigerant Management": Indicating that products meet requirements for refrigerant management.
8. Product Data for EA Credit "Advanced Energy Metering": For continuous metering equipment.
9. Product Data for EQ Credit "Acoustic Performance": Documentation indicating that systems and equipment comply.
10. Product Data for Credit IEQ 1, "Outdoor Air Delivery Monitoring": Documentation indicating that systems, equipment, and controls comply.
11. Thermal Comfort: Product Data indicating that systems, equipment, and controls comply.

C. Shop Drawings: For VRF HVAC systems.

1. Include diagrams and details of refrigerant piping and tubing showing installation requirements for manufacturer-furnished divided flow fittings.
2. Include diagrams for power, signal, and control wiring.

D. Additional Informational Submittals:

1. Include calculations with corresponding diagram of refrigerant piping and tubing sizing for each system installed.
2. Include calculations with corresponding floor plans indicating that refrigerant concentration limits are within allowable limits of ASHRAE 15 and Chapter 11 of the NYC Mechanical Code.
3. Include calculations showing that system travel distance for refrigerant piping and controls cabling are within horizontal and vertical travel distances set by manufacturer. Provide a comparison table for each system installed.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data:

1. For Installer: Certificate from VRF HVAC system manufacturer certifying that Installer has successfully completed prerequisite training administered by manufacturer for proper installation of systems, including but not limited to, equipment, piping, controls, and accessories indicated and furnished for installation.

   a. Retain copies of Installer certificates on-site and make available on request.

B. Source quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For VRF HVAC systems to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Manufacturer's Qualifications:

1. Nationally recognized manufacturer of VRF HVAC systems and products.
2. Shipped VRF HVAC systems with similar requirements to those indicated for a continuous period of three years.
3. VRF HVAC systems and products that have been successfully tested and in use on projects of similar size and scope as this project.
4. Having complete published catalog literature, installation, and operation and maintenance manuals for all products intended for use.
5. Having full-time in-house employees for the following:

a. Product research and development.
b. Product and application engineering.
c. Product manufacturing, testing, and quality control.
d. Technical support for system installation, startup, commissioning, and troubleshooting of installations.
e. User Instruction.

C. Factory-Authorized Service Representative Qualifications:

1. Authorized representative of, and trained by, VRF HVAC system manufacturer.
2. In-place facility located within proximity of Project.
3. Demonstrated past experience with products being installed.
4. Demonstrated past experience on projects of similar complexity, scope, and value.
5. Staffing resources of competent and experienced full-time employees that are assigned to execute work according to schedule.
6. Service and maintenance staff assigned to support Project during warranty period.
7. Product parts inventory to support ongoing system operation.

D. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by VRF HVAC system manufacturer.

1. Each employee certified by manufacturer for proper installation of systems, including, but not limited to, equipment, piping, controls, and accessories indicated and furnished for installation.
2. Installer certification to be valid and current for duration of Project.
3. Retain copies of Installer certificates on-site and make available on request.
4. Installers have staffing resources of competent, trained, and experienced full-time employees that are assigned to execute work according to schedule.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in a clean and dry place.

B. Comply with manufacturer's written rigging and installation instructions for unloading and moving to final installed location.

C. Handle products carefully to prevent damage, breaking, denting, and scoring. Do not install damaged products.

D. Protect products from weather, dirt, dust, water, construction debris, and physical damage.

1. Retain factory-applied coverings on equipment to protect finishes during construction and remove just prior to operating unit.
2. Cover unit openings before installation to prevent dirt and dust from entering inside of units. If required to remover coverings during unit installation, reapply coverings over openings after unit installation and remove just prior to operating unit.

E. Replace installed products damaged during construction.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace equipment and components that fail(s) in materials or workmanship within specified warranty period.

1. Warranty Period:

a. For Compressor: 10 year(s) from date of Substantial Completion.
b. For Parts, Including Controls: 10 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 VRF HVAC SYSTEMS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Daikin or comparable product by one of the following:

1. LG Electronics.
2. Mitsubishi Electric & Electronics USA, Inc.
3. Samsung HVAC.
4. Or approved equal.

B. Source Limitations: Obtain products from single source from single manufacturer including, but not limited to, the following:

1. Indoor and outdoor units, including accessories.
2. Controls and software.
3. HRCUs.

2.2 SYSTEM DESCRIPTION

A. Direct-expansion (DX) VRF HVAC system(s) with variable capacity in response to varying cooling and heating loads. System must consist of multiple indoor units, HRCUs, outdoor unit(s), piping, controls, and electrical power to make complete operating system(s) complying with requirements indicated.

1. Two-pipe or three-pipe system design.
2. System(s) operation, heat recovery as indicated on Drawings.
3. Each system with one refrigerant circuit shared by all indoor units connected to system.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. AHRI Compliance: System and equipment performance certified according to AHRI 1230 and products listed in AHRI directory.

D. ASHRAE Compliance:

1. ASHRAE 15: For safety code for mechanical refrigeration.
2. ASHRAE 62.1: For indoor air quality.
3. ASHRAE 135: For control network protocol with remote communication.
4. ASHRAE/IES 90.1 Compliance: For system and component energy efficiency.

E. UL Compliance: Comply with UL 1995.

2.3 INDOOR, CONCEALED, CEILING-MOUNTED UNITS FOR DUCTING

A. Description: Factory-assembled complete unit with components, piping, wiring, and controls required for mating to ductwork, piping, power, and controls field connections.

B. Cabinet:

1. Material: Galvanized steel.
2. Insulation: Manufacturer's standard internal insulation to provide thermal resistance and prevent condensation.
3. Duct Connections: Extended collar or flange, or designated exterior cabinet surface, designed for attaching field-installed ductwork.
4. Mounting: Manufacturer-designed provisions for field installation.
5. Internal Access: Removable panels or hinged doors of adequate size for field access to internal components for inspection, cleaning, service, and replacement.

C. Fan and Motor Assembly:

1. Fan(s):

a. Direct-drive arrangement.
b. Single or multiple fans connected to a common motor shaft and driven by a single motor.
c. Fabricated from non-ferrous components or ferrous components with corrosion-resistant finish.
d. Wheels statically and dynamically balanced.

2. Motor: Brushless dc or electronically commutated with permanently lubricated bearings.
3. Motor Protection: Integral protection against thermal, overload, and voltage fluctuations.
4. Speed Settings and Control: Two (low, high), three (low, medium, high), or more than three speed settings or variable speed with a speed range of least 50 percent.
5. Vibration Control: Integral isolation to dampen vibration transmission.

D. Filter Assembly:

1. Access: Bottom, side, or rear to accommodate field installation without removing ductwork and to accommodate filter replacement without need for tools.
2. Efficiency: ASHRAE 52.2, MERV 13.
3. Media:

   a. Replaceable: Extended surface, panel, or cartridge with antimicrobial treatment fiber media.

E. Unit Controls:

1. Factory-Installed Controller: Configurable digital control.
2. Communication: Network communication with other indoor and outdoor units.
3. Cable and Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
4. Field Connection: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.

F. Unit Electrical:

1. Enclosure: Metal, suitable for indoor locations.
2. Field Connection: Single point connection to power unit and integral controls.
3. Disconnecting Means: Factory-mounted circuit breaker or switch.
4. Control Transformer: Manufacturer's standard. Coordinate requirements with field power supply.
5. Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
6. Raceways: Enclose line voltage wiring in metal raceways.

2.4 INDOOR, EXPOSED, WALL-MOUNTED UNITS

A. Description: Factory-assembled complete unit with components, piping, wiring, and controls required for mating to piping, power, and controls field connections.

B. Cabinet:

1. Material: Painted steel, or coated steel frame covered by a plastic cabinet, with an architectural acceptable finish suitable for tenant occupancy on exposed surfaces.
2. Insulation: Manufacturer's standard internal insulation to provide thermal resistance and prevent condensation.
3. Mounting: Manufacturer-designed provisions for field installation.
4. Internal Access: Removable panels of adequate size for field access to internal components for inspection, cleaning, service, and replacement.

C. Fan and Motor Assembly:

1. Fan(s):

   a. Direct-drive arrangement.
   b. Single or multiple fans connected to a common motor shaft and driven by a single motor.

c. Fabricated from non-ferrous components or ferrous components with corrosion protection finish.
d. Wheels statically and dynamically balanced.

2. Motor: Brushless dc or electronically commutated with permanently lubricated bearings.
3. Motor Protection: Integral protection against thermal, overload, and voltage fluctuations.
4. Speed Settings and Control: Two (low, high), three (low, medium, high), or more than three speed settings or variable speed with a speed range of least 50 percent.
5. Vibration Control: Integral isolation to dampen vibration transmission.

D. Filter Assembly:

1. Access: Front, to accommodate filter replacement without the need for tools.
2. Washable Media: Manufacturer's standard filter with antimicrobial treatment.

E. Unit Controls:

1. Factory-Installed Controller: Configurable digital control.
2. Communication: Network communication with other indoor units and outdoor unit(s).
3. Cable and Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
4. Field Connection: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.

F. Unit Electrical:

1. Enclosure: Manufacturer's standard, and suitable for indoor locations.
2. Field Connection: Single point connection to power entire unit and integral controls.
3. Disconnecting Means: Factory-mounted circuit breaker or switch, complying with NFPA 70.
4. Control Transformer: Manufacturer's standard. Coordinate requirements with field power supply.
5. Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
6. Raceways: Enclose line voltage wiring in metal raceways to comply with NFPA 70.

2.5 INDOOR, RECESSED, CEILING-MOUNTED UNITS

A. Description: Factory-assembled complete unit with components, piping, wiring, and controls required for mating to ductwork, piping, power, and controls field connections.

B. Fan and Motor Assembly:

1. Fan(s):

a. Direct-drive arrangement.
b. Single or multiple fans connected to a common motor shaft and driven by a single motor.
c. Fabricated from non-ferrous components or ferrous components with corrosion protection finish.
d. Wheels statically and dynamically balanced.

2. Motor: Brushless dc or electronically commutated with permanently lubricated bearings.
3. Motor Protection: Integral protection against thermal, overload, and voltage fluctuations.

4. Speed Settings and Control: Two (low, high), three (low, medium, high), or more than three speed settings or variable speed with a speed range of least 50 percent.
5. Vibration Control: Integral isolation to dampen vibration transmission.

C. Filter Assembly:

1. Access: Bottom, to accommodate filter replacement without the need for tools.
2. Efficiency: ASHRAE 52.2, MERV 13.

D. Unit Controls:

1. Factory-Installed Controller: Configurable digital control.
2. Communication: Network communication with other indoor units and outdoor unit(s).
3. Cable and Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
4. Field Connection: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.

E. Unit Electrical:

1. Enclosure: Manufacturer's standard, and suitable for indoor locations.
2. Field Connection: Single point connection to power entire unit and integral controls.
3. Disconnecting Means: Factory-mounted circuit breaker or switch, complying with NFPA 70.
4. Control Transformer: Manufacturer's standard. Coordinate requirements with field power supply.
5. Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
6. Raceways: Enclose line voltage wiring in metal raceways to comply with NFPA 70.

2.6 OUTDOOR, AIR-SOURCE HEAT RECOVERY UNITS

A. Description: Factory-assembled and -tested complete unit with components, piping, wiring, and controls required for mating to piping, power, and controls field connections.

1. Specially designed for use in systems with simultaneous heating and cooling.
2. Systems must consist of one unit, or multiple unit modules that are designed by variable refrigerant system manufacturer for field interconnection to make a single refrigeration circuit that connects multiple indoor units.
3. All units installed must be from the same product development generation.

B. Cabinet:

1. Galvanized steel and coated with a corrosion-resistant finish.
2. Mounting: Manufacturer-designed provisions for field installation.
3. Internal Access: Removable panels or hinged doors of adequate size for field access to internal components for inspection, cleaning, service, and replacement.

C. Compressor and Motor Assembly:

1. One or more positive-displacement, direct-drive and hermetically sealed scroll compressor(s) with inverter drive and turndown to 15 percent of rated capacity.

2. Speed Control: Variable to automatically maintain refrigerant suction and condensing pressures while varying refrigerant flow to satisfy system cooling and heating loads.
3. Vibration Control: Integral isolation to dampen vibration transmission.
4. Oil management system to ensure safe and proper lubrication over entire operating range.
5. Crankcase heaters with integral control to maintain safe operating temperature.
6. Fusible plug.

D. Condenser Fan and Motor Assembly:

1. Fan(s): Propeller type.

   a. Direct-drive arrangement.
   b. Fabricated from non-ferrous components or ferrous components with corrosion protection finish to match performance indicated for condenser coil.
   c. Statically and dynamically balanced.

2. Fan Guards: Removable safety guards complying with OSHA regulations. If using metal materials, coat with corrosion-resistant coating to match performance indicated for condenser coil.
3. Motor(s): Brushless dc or electronically commutated with permanently lubricated bearings and rated for outdoor duty.
4. Motor Protection: Integral protection against thermal, overload, and voltage fluctuations.
5. Speed Settings and Control: Variable speed with a speed range of least 75 percent.
6. Vibration Control: Integral isolation to dampen vibration transmission.

E. Drain Pan: If required by manufacturer's design, provide unit with non-ferrous drain pan with bottom sloped to a low point drain connection.

F. Unit Controls:

1. Enclosure: Manufacturer's standard, and suitable for unprotected outdoor locations.
2. Factory-Installed Controller: Configurable digital control.
3. Communication: Network communication with indoor units and other outdoor unit(s).
4. Cable and Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
5. Field Connection: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.

G. Unit Electrical:

1. Enclosure: Metal, similar to enclosure, and suitable for unprotected outdoor locations.
2. Field Connection: Single point connection to power entire unit and integral controls.
3. Disconnecting Means: Factory-mounted circuit breaker or switch, complying with NFPA 70.
4. Control Transformer: Manufacturer's standard. Coordinate requirements with field power supply.
5. Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
6. Raceways: Enclose line voltage wiring in metal raceways to comply with NFPA 70.

H. Unit Piping:

1. Unit Tubing: Copper tubing with brazed joints.
2. Unit Tubing Insulation: Manufacturer's standard insulation, of thickness to prevent condensation.

3. Field Piping Connections: Manufacturer's standard.
4. Factory Charge: Dehydrated air or nitrogen.
5. Testing: Factory pressure tested and verified to be without leaks.

2.7 HEAT RECOVERY CONTROL UNITS (HRCUs)

A. Description: Factory-assembled and -tested complete unit with components, piping, wiring, and controls required for mating to piping, power, and controls field connections.

1. Specially designed for use in systems with simultaneous heating and cooling.
2. Systems must consist of one unit, or multiple unit that are designed by variable refrigerant system manufacturer for field interconnection to make a single refrigeration circuit that connects multiple indoor units.

B. Cabinet:

1. Galvanized-steel construction.
2. Insulation: Manufacturer's standard internal insulation to provide thermal resistance and prevent condensation.
3. Mounting: Manufacturer-designed provisions for field installation.
4. Internal Access: Removable panels or hinged doors of adequate size for field access to internal components for inspection, cleaning, service, and replacement.

C. Drain Pan: If required by manufacturer's design, provide unit with non-ferrous drain pan with bottom sloped to a low point drain connection.

D. Refrigeration Assemblies and Specialties:

1. Specially designed by manufacturer for type of VRF HVAC system being installed, either two or three pipe.
2. Each refrigerant branch circuit must have refrigerant control valve(s) to control refrigerant flow.
3. Spares: Each heat recovery control unit must include at least two branch circuit port(s) for future use.
4. Each system piping connection upstream of heat recovery unit must be fitted with an isolation valve to allow for service to any heat recovery control unit in the system without interrupting operation of the system.
5. Each branch circuit connection must be fitted with an isolation valve and capped service port to allow for service to any individual branch circuit without interrupting operation of the system.

   a. If not available as an integral part of the heat recovery control unit, isolation valves must be field installed adjacent to the unit pipe connection.

E. Unit Controls:

1. Enclosure: Manufacturer's standard, and suitable for indoor locations.
2. Factory-Installed Controller: Configurable digital control.
3. Communication: Network communication with indoor units and outdoor unit(s).
4. Cable and Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
5. Field Connection: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.

F. Unit Electrical:

1. Enclosure: Metal, similar to enclosure, and suitable for indoor locations.
2. Field Connection: Single point connection to power entire unit and integral controls.
3. Disconnecting Means: Factory-mounted circuit breaker or switch, complying with NFPA 70.
4. Control Transformer: Manufacturer's standard. Coordinate requirements with field power supply.
5. Wiring: Manufacturer's standard with each connection labeled and corresponding to a unit-mounted wiring diagram.
6. Raceways: Enclose line voltage wiring in metal raceways to comply with NFPA 70.

G. Unit Piping:

1. Unit Tubing: Copper tubing with brazed joints.
2. Unit Tubing Insulation: Manufacturer's standard insulation, of thickness to prevent condensation.
3. Field Piping Connections: Manufacturer's standard.
4. Factory Charge: Dehydrated air or nitrogen.
5. Testing: Factory pressure tested and verified to be without leaks.

2.8 SYSTEM CONTROLS

A. General Requirements:

1. Network: Indoor units, HRCUs, and outdoor units must include integral controls and connect through a manufacturer-selected control network.
2. Network Communication Protocol: Manufacturer proprietary or open control communication between interconnected units.
3. Integration with Building Automation System: ASHRAE 135, BACnet IP and certified by BACnet Testing Lab (BTL), including the following:

    a. Ethernet connection via RJ-45 connectors and port with transmission at 100 Mbps or higher.
    b. Integration must include control monitoring scheduling change of value notifications.

4. Operator Interface:

    a. Operators must interface with system and unit controls through the following:

        1) Operator interfaces integral to controllers.
        2) Web interface through web browser software.

B. Central Controllers:

1. Centralized control for all indoor and outdoor units from a single central controller location.

    a. Include multiple interconnected controllers as required.

2. Controls operation mode of indoor units as individual units, by selected groups of indoor units, or as collection of all indoor units. Operation modes available through central controller must match those operation modes of controllers for indoor units.
3. Schedule operation of indoor units as individual units, by selected groups of indoor units, or as collection of all indoor units.

a. Sets schedule for daily, weekly, and annual events.
b. Schedule options available through central controller must at least include the schedule options of controllers for indoor units.

4. Changes operating set points of indoor units as individual units, by selected groups of indoor units, or as collection of all indoor units.
5. Optimized start feature to start indoor units before scheduled time to reach temperature set-point at scheduled time based on operating history.
6. Night setback feature to operate indoor units at energy-conserving heating and cooling temperature set-points during unoccupied periods.
7. Service diagnostics tool.
8. Able to disable and enable operation of individual controllers for indoor units.
9. Information displayed on individual controllers must also be available for display through central controller.
10. Multiple RJ-45 ports for direct connection to a local PC and an Ethernet network switch.
11. Operator interface through a backlit, high-resolution color display touch panel and web accessible through standard web browser software.

C. Wired Controllers for Indoor Units:

1. Single controller capable of controlling multiple indoor units as group.
2. Auto Timeout Touch Screen LCD: Timeout duration must be adjustable.
3. Multiple Language: English
4. Temperature Units: Fahrenheit On/Off: Turns indoor unit on or off.
5. Hold: Hold operation settings until hold is released.
6. Operation Mode: Cool, Heat, Auto, Dehumidification, Fan Only, and Setback.
7. Temperature Display: 1-degree increments.
8. Temperature Set-Point: Separate set points for Cooling, Heating, and Setback. Adjustable in 1-degree increments
9. Relative Humidity Display: 1 percent increments.
10. Relative Humidity Set-Point: Adjustable in 1 percent increments.
11. Fan Speed Setting: Select between available options furnished with the unit.
12. Airflow Direction Setting: If applicable to unit, select between available options furnished with the unit.
13. Seven-day programmable operating schedule with up to five eight events per day. Operations must include On/Off, Operation Mode, and Temperature Set-Point.
14. Auto Off Timer: Operates unit for an adjustable time duration and then turns unit off.
15. Occupancy detection.
16. Service Notification Display: "Filter" .
17. Service Run Tests: Limit use by service personnel to troubleshoot operation.
18. Error Code Notification Display: Used by service personnel to troubleshoot abnormal operation and equipment failure.
19. User and Service Passwords: Capable of preventing adjustments by unauthorized users.
20. Setting stored in nonvolatile memory to ensure that settings are not lost if power is lost. Battery backup for date and time only.
21. Low-voltage power required for controller must be powered through non-polar connections to indoor unit.

2.9 SYSTEM REFRIGERANT AND OIL

A. Refrigerant:

1. As required by VRF HVAC system manufacturer for system to comply with performance requirements indicated.
2. ASHRAE 34, Class A1 refrigerant classification.
3. R-410a.

B. Oil:

1. As required by VRF HVAC system manufacturer and to comply with performance requirements indicated.

2.10 SYSTEM CONDENSATE DRAIN PIPING

A. If more than one material is listed, material selection is Contractor's option.

B. Copper Tubing:

1. Drawn-Temper Tubing: According to ASTM B88, Type L or Type DWV according to ASTM B306.
2. Wrought-Copper Fittings: ASME B16.22.
3. Wrought-Copper Unions: ASME B16.22.
4. Solder Filler Metals: ASTM B32, lead-free alloys, and water-flushable flux according to ASTM B813.

C. CPVC plastic pipe according to ASTM F441/F441M, Schedule 40, with socket-type pipe fittings according to ASTM F438 and solvent cement according to ASTM F493.

2.11 SYSTEM REFRIGERANT PIPING

A. Comply with requirements in Section 232300 "Refrigerant Piping" for system piping requirements.

B. Refrigerant Tubing Kits:

1. Furnished by VRF HVAC system manufacturer.
2. Factory-rolled and -bundled, soft-copper tubing with tubing termination fittings at each end.
3. Standard one-piece length for connecting to indoor units.
4. Pre-insulated with flexible elastomeric insulation of thickness to comply with the NYC Energy Conservation Code and sufficient to eliminate condensation.
5. Factory Charge: Dehydrated air or nitrogen.

C. Divided-Flow Specialty Fittings: Where required by VRF HVAC system manufacturer for proper system operation, VRF HVAC system manufacturer must furnish specialty fittings with identification and instructions for proper installation by Installer.

D. Refrigerant Isolation Ball Valves:

1. Description: Uni-body full port design, rated for maximum system temperature and pressure, and factory tested under pressure to ensure tight shutoff. Designed for valve operation without removing seal cap.
2. Seals: Compatible with system refrigerant and oil. Seal service life of at least 20 years.
3. Valve Connections: Flare or sweat depending on size.

2.12 PIPING AND TUBING INSULATION

A. Comply with requirements in Section 230719 "HVAC Piping Insulation" for system piping insulation requirements.

B. Condensate Drain Piping and Tubing Insulation and Jacket Requirements:

1. Flexible Elastomeric Insulation:

   a. Closed-cell, sponge- or expanded-rubber materials, complying with ASTM C534, Type I for tubular materials.
   b. Indoors: 1/2 inch 3/4 inch 1 inch thick.
   c. Outdoors: 1/2 inch 3/4 inch 1 inch thick.

2. Field-Applied Jacket:

   a. Concealed: None required.
   b. Indoors, Exposed to View: PVC, color selected by Commissioner, 20 mils thick.
   c. Outdoors, Exposed to View: Aluminum, smooth, 0.020 inch thick.

C. Refrigerant Tubing Insulation and Jacket Requirements:

1. Flexible Elastomeric Insulation:

   a. Closed-cell, sponge- or expanded-rubber materials, complying with ASTM C534, Type I for tubular materials.
   b. Indoors: 1 inch thick.
   c. Outdoors: 1 inch thick.

2. Field-Applied Jacket:

   a. Concealed: None required.
   b. Indoors, Exposed to View: None required PVC, 20 mils thick PVC, color selected by Commissioner, 20 mils thick.
   c. Outdoors, Exposed to View: None required Aluminum, smooth, 0.020 inch thick.

D. Flexible Elastomeric Insulation Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Adhesive must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

F. Metal Jacket Flashing Sealants:

1. Materials must be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: Aluminum.
5. Sealant must comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.13 MATERIALS

A. Steel:

1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for steel sheet.

B. Stainless Steel:

1. Manufacturer's standard grade for casing.
2. Manufacturer's standard type, ASTM A240/A240M for bare steel exposed to airstream or moisture.

C. Galvanized Steel: ASTM A653/A653M.

D. Aluminum: ASTM B209.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine products before installation. Reject products that are wet, moisture damaged, or mold damaged.

C. Examine roughing-in for piping and tubing to verify actual locations of connections before equipment installation.

D. Examine roughing-in for ductwork to verify actual locations of connections before equipment installation.

E. Examine roughing-in for wiring and conduit to verify actual locations of connections before equipment installation.

F. Examine walls, floors, roofs, and outdoor pads for suitable conditions where equipment will be installed.

G. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

H. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 EQUIPMENT INSTALLATION, GENERAL

A. Clearance:

1. Maintain manufacturer's recommended clearances for service and maintenance.

B. Loose Components: Install components, devices, and accessories furnished by manufacturer, with equipment, that are not factory mounted.

1. Loose components must be installed by system Installer under supervision of manufacturer's service representative.

3.4 INSTALLATION OF INDOOR UNITS

A. Install units to be level and plumb while providing a neat and finished appearance.

B. Unless otherwise required by VRF HVAC system manufacturer, support ceiling-mounted units from structure above using threaded rods; minimum rod size of 3/8 inch.

C. Adjust supports of exposed and recessed units to draw units tight to adjoining surfaces.

D. Protect finished surfaces of ceilings, floors, and walls that come in direct contact with units. Refinish or replaced damaged areas after units are installed.

E. In rooms with ceilings, conceal piping and tubing, controls, and electrical power serving units above ceilings.

F. In rooms without ceiling, arrange piping and tubing, controls, and electrical power serving units to provide a neat and finished appearance.

G. Provide lateral bracing if needed to limit movement of suspended units to not more than 0.25 inch.

H. For floor- and wall-mounted units that are exposed, conceal piping and tubing, controls, and electrical power serving units within walls.

I. Attachment: Install hardware for proper attachment to supported equipment.

3.5 INSTALLATION OF OUTDOOR UNITS

A. Install units to be level and plumb while providing a neat and finished appearance.

B. Install outdoor units on support structures indicated on Drawings.

C. Roof-Mounted Installations: Install outdoor units on equipment supports specified in Section 077200 "Roof Accessories." Anchor units to supports with removable, stainless-steel fasteners.

3.6 GENERAL REQUIREMENTS FOR PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping and tubing systems. Install piping and tubing as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping and tubing in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping and tubing at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping and tubing above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping and tubing to permit valve servicing.

F. Install piping and tubing at indicated slopes.

G. Install piping and tubing free of sags.

H. Install fittings for changes in direction and branch connections.

I. Install piping and tubing to allow application of insulation.

J. Install groups of pipes and tubing parallel to each other, spaced to permit applying insulation with service access between insulated piping and tubing.

K. Install sleeves for piping and tubing penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230500 "Common Work Results for HVAC."

L. Install escutcheons for piping and tubing penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230500 "Common Work Results for HVAC."

3.7 INSTALLATION OF SYSTEM CONDENSATE DRAIN PIPING

A. General Requirements for Drain Piping and Tubing:

1. Install a union in piping at each threaded unit connection.
2. Install an adjustable stainless-steel hose clamp with adjustable gear operator on unit hose connections. Tighten clamp to provide a leak-free installation.
3. If required for unit installation, provide a trap assembly in drain piping to prevent air circulated through unit from passing through drain piping. Comply with more stringent of the following:

    a. Details indicated on Drawings.

b. Manufacturer's requirements.
c. The NYC Mechanical Code.
d. In the absence of requirements, comply with ASHRAE requirements.

4. Extend drain piping from units with drain connections to drain receptors as indicated on Drawings. If not indicated on Drawings, terminate drain connection at nearest accessible location that is not exposed to view by occupants.
5. Provide each 90-degree change in direction with a Y- or T-fitting. Install a threaded plug connection in the dormant side of fitting or future use as a service cleanout.

B. Gravity Drains:

1. Slope piping from unit connection toward drain termination at a constant slope of not less than two percent.

C. Pumped Drains:

1. If unit condensate pump or lift mechanism is not included with an integral check valve, install a full-size check valve in each branch pipe near unit connection to prevent backflow into unit.

3.8 INSTALLATION OF REFRIGERANT PIPING

A. Refrigerant Tubing Kits:

1. Unroll and straighten tubing to suit installation. Deviations in straightness of exposed tubing must be unnoticeable to observer.
2. Support tubing using hangers and supports indicated at intervals not to exceed 5 feet. Minimum rod size, 1/4 inch.
3. Prepare tubing ends and make mating connections to provide a pressure tight and leak-free installation.

B. Install refrigerant piping according to ASHRAE 15 and Chapter 11 of the NYC Mechanical Code.

C. Select system components with pressure rating equal to or greater than system operating pressure.

D. Install piping as short and direct as possible, with a minimum number of joints and fittings.

E. Arrange piping to allow inspection and service of equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Section 083113 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

F. Install refrigerant piping and tubing in protective conduit where installed belowground.

G. Install refrigerant piping and tubing in rigid or flexible conduit in locations where exposed to mechanical damage.

H. Unless otherwise required by VRF HVAC system manufacturer, slope refrigerant piping and tubing as follows:

1. Install horizontal hot-gas discharge piping and tubing with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps to entrain oil in vertical runs.
4. Liquid lines may be installed level.

I. When brazing, remove or protect components that could be damaged by heat.

J. Before installation, clean piping, tubing, and fittings to cleanliness level required by VRF HVAC system manufacturer.

K. Joint Construction:

1. Ream ends of tubes and remove burrs.
2. Remove scale, slag, dirt, and debris from inside and outside of tube and fittings before assembly.
3. Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

   a. Use Type BCuP (copper-phosphorus) alloy for joining copper fittings with copper tubing.
   b. Use Type BAg (cadmium-free silver) alloy for joining copper with bronze.

3.9 INSTALLATION OF PIPING AND TUBING INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated. Installation to maintain a continuous vapor barrier.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are unavailable, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

E. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.10 INSTALLATION OF DUCT, ACCESSORIES, AND AIR OUTLETS

A. Where installing ductwork adjacent to equipment, allow space for service and maintenance.

B. Comply with requirements for metal ducts specified in Section 233113 "Metal Ducts."

C. Comply with requirements for air duct accessories specified in Section 233300 "Air Duct Accessories."

D. Comply with requirements for air diffusers specified in Section 233713.13 "Air Diffusers."

E. Comply with requirements for registers and grilles specified in Section 233713.23 " Air Registers and Grilles."

3.11 ELECTRICAL CONNECTIONS

A. Comply with requirements indicated on Drawings and in applicable Division 26 Sections.

B. Connect field electrical power source to each separate electrical device requiring field electrical power. Coordinate termination point and connection type with Installer.

C. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

D. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems" for grounding connections.

E. Install nameplate or acrylic label with self-adhesive back for each electrical connection indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated phenolic layers of black with engraved white letters. Letters at least 1/2 inch high.
2. Locate nameplate or label where easily visible.

F. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems" for raceway selection and installation requirements for conduits as supplemented or revised in this Section.

G. Comply with requirements in Section 260533.16 "Boxes and Covers for Electrical Systems" for box selection and installation requirements for boxes as supplemented or revised in this Section.

H. Comply with requirements in Section 260533.13 "Conduits for Electrical Systems" for wireways selection and installation requirements for wireways as supplemented or revised in this Section.

I. Comply with TIA-569-D for pull-box sizing and length of conduit and number of bends between pull points.

J. Install manufactured conduit sweeps and long-radius elbows if possible.

K. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

3.12 SOFTWARE

A. Cybersecurity:

1. Software:

a. Coordinate security requirements with the Commissioner.
b. Ensure that latest stable software release is installed and properly operating.
c. Disable or change default passwords to password using a combination of uppercase and lower letters, numbers, and symbols at least eight characters in length. Record passwords and turn over to party responsible for system operation and administration.

2. Hardware:

a. Coordinate location and access requirements with the Commissioner.
b. Enable highest level of wireless encryption that is compatible with the City of New York's ICT network.
c. Disable dual network connections.

3.13 INSTALLATION OF SYSTEM CONTROL CABLE

A. Comply with NECA 1.

B. Installation Method:

1. Install cables in raceways except as follows:

a. Within equipment and associated control enclosures.
b. In accessible ceiling spaces where open cable installation method may be used.
c. In gypsum board partitions where cable may be enclosed within wall cavity.

2. Conceal raceway and cables except in unfinished spaces.

C. General Requirements for Cabling:

1. Comply with TIA-568-C Series of standards.
2. Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems."
3. Terminate all conductors; no cable must contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
4. Cables may not be spliced and must be continuous from terminal to terminal. Do not splice cable.
5. Cables serving a common system may be grouped in a common raceway. Install control cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.
6. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Install lacing bars and distribution spools.

8. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Monitor cable pull tensions.
11. Support: Do not allow cables to lie on removable ceiling tiles or access panels.
12. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.
13. Provide strain relief.
14. Keep runs short. Allow extra length for connecting to terminals.
15. Do not bend cables in a radius less than 10 times the cable OD.
16. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.
17. Ground wire must be copper, and grounding methods must comply with IEEE C2. Demonstrate ground resistance.

D. Balanced Twisted-Pair Cable Installation:

1. Comply with TIA-568-C.2.
2. Do not untwist balanced twisted-pair cables more than 1/2 inch at the point of termination to maintain cable geometry.

E. Open-Cable Installation:

1. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 30 inches apart.
2. Cable must not be run through or on structural members or in contact with pipes, ducts, or other potentially damaging items. Do not run cables between structural members and corrugated panels.

F. Separation from EMI Sources: Comply with BICSI TDMM and TIA-569-D recommendations for separating unshielded cable from potential EMI sources including electrical power wiring and equipment.

3.14 FIRESTOPPING

A. Comply with requirements in Section 078413 "Penetration Firestopping."

B. Comply with TIA-569-D, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping" Chapter.

3.15 GROUNDING INSTALLATION

A. For data communication wiring, comply with TIA-607-B and with BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.

B. For low-voltage control cabling, comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.16 IDENTIFICATION

A. Identify system equipment, piping, tubing, and valves. Comply with requirements for identification specified in Section 230553 "Identification for HVAC Piping and Equipment."

B. Identify system electrical and controls components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

1. Identify each control cable on each end and at each terminal with a number-coded identification tag. Each cable must have a unique tag.

3.17 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage VRF HVAC system manufacturer's service representative to advise and assist installers; witness testing; and observe and inspect components, assemblies, and equipment installations, including controls and connections.

1. Field service must be performed by an employee or a factory-trained and -authorized service representative of VRF HVAC system manufacturer whose primary job responsibilities are to provide direct technical support of its products.

a. Additional factory-authorized representatives may assist with completion of certain activities only if supervised by manufacturer's employee. A factory-authorized representative must not provide assistance without manufacturer's employee supervision.

2. Manufacturer must provide on-site visits during the course of construction at installation milestones indicated. System Installer must coordinate each visit in advance to give manufacturer sufficient notice to plan the visit.

a. First Visit: Kick-off meeting.
b. Second Visit: At approximately 25 percent completion of system(s).
c. Third Visit: At approximately 50 percent completion of system(s).
d. Fourth Visit: At approximately 75 percent completion of system(s).
e. Fifth Visit: Final inspection before system startup.

3. Site Visits: Activities for each site visit must include the following:

a. Meet with VRF HVAC system Installer to discuss field activities, issues, and suggested methods to result in a successful installation.
b. Offer technical support to Installer and related trades as related to VRF system(s) being installed.
c. Review progress of VRF HVAC system(s) installation for strict compliance with manufacturer's requirements.
d. Advise and if necessary assist Installer with updating related refrigerant calculations and system documentation.
e. Issue a report for each visit, documenting the visit.

1) Report to include name and contact information of individual making the visit.
2) Date(s) and time frames while on-site.

3) Names and contact information of people meeting with while on-site.
4) Clearly identify and list each separate issue that requires resolution. For each issue, provide a unique identification number, relevant importance, specific location or equipment identification, description of issue, recommended corrective action, and follow-up requirements needed. Include a digital photo for clarification if deemed to be beneficial.

4. Final Inspection before Startup:

a. Before inspection, Installer to provide written request to manufacturer stating the system is fully installed according manufacturer's requirements and ready for final inspection.
b. All system equipment and operating components must be inspected. If components are inaccessible for inspection, they must be made accessible before the final inspection can be completed.
c. Manufacturer must provide a comprehensive inspection of all equipment and each operating component that comprise the complete system(s). Inspection must follow a detailed checklist specific to each equipment and operating component.
d. Inspection reports for indoor units must include, but not be limited to, the following:

1) Unit designation on Drawings.
2) Manufacturer model number.
3) Serial number.
4) Each equipment setting.
5) Mounting, supports, and restraints properly installed.
6) Proper service clearance provided.
7) Wiring and power connections correct.
8) Line-voltage reading(s) within acceptable range.
9) Wiring and controls connections correct.
10) Low-voltage reading(s) within an acceptable range.
11) Controller type and model controlling unit.
12) Controller location.
13) Temperature settings and readings within an acceptable range.
14) Condensate removal acceptable.
15) Fan settings and readings within an acceptable range.
16) Unit airflow direction within an acceptable range.
17) If applicable, fan external static pressure setting.
18) Filter type and condition acceptable.
19) Refrigerant piping properly connected and insulated.
20) Condensate drain piping properly connected and insulated.
21) If applicable, ductwork properly connected.
22) If applicable, external interlocks properly connected.
23) Remarks.

e. Inspection reports for outdoor units must include, but not be limited to, the following:

1) Unit designation on Drawings.
2) Manufacturer model number.
3) Serial number.
4) Network address, if applicable.
5) Each equipment setting.
6) Mounting, supports, and restraints properly installed.

7) Proper service clearance provided.
8) Wiring and power connections correct.
9) Line-voltage reading(s) within acceptable range.
10) Wiring and controls connections correct.
11) Low-voltage reading(s) within an acceptable range.
12) Condensate removal acceptable.
13) Noise level within an acceptable range.
14) Refrigerant piping properly connected and insulated.
15) Condensate drain piping properly connected and insulated.
16) Remarks.

f. Installer must provide manufacturer with the requested documentation and technical support during inspection.
g. Installer must correct observed deficiencies found by the inspection.
h. Upon completing the on-site inspection, manufacturer must provide a written report with complete documentation describing each inspection step, the result, and any corrective action required.
i. If corrective action is required by Installer that cannot be completed during the same visit, provide additional visits, as required, until deficiencies are resolved and systems are deemed ready for startup.
j. Final report must indicate the system(s) inspected are installed according to manufacturer's requirements and are ready for startup.

B. Perform the following tests and inspections with the assistance of manufacturer's service representative:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Refrigerant Tubing Positive Pressure Testing:

1. Comply with more stringent of VRF HVAC system manufacturer's requirements and requirements indicated.
2. After completion of tubing installation, pressurize tubing systems to a test pressure of not less than 1.5 times VRF HVAC system operating pressure, but not less than 600 psig, using dry nitrogen.
3. Successful testing must maintain a test pressure for a continuous and uninterrupted period of 24 hours. Allowance for pressure changes attributed to changes in ambient temperature are acceptable.
4. Prepare test report to record the following information for each test:

a. Name of person starting test, company name, phone number, and e-mail address.
b. Name of manufacturer's service representative witnessing test, company name, phone number, and e-mail address.
c. Detailed description of extent of tubing tested.
d. Date and time at start of test.
e. Test pressure at start of test.
f. Outdoor temperature at start of test.
g. Name of person ending test, company name, phone number, and e-mail address.

h. Date and time at end of test.
i. Test pressure at end of test.
j. Outdoor temperature at end of test.

5. Submit test reports for Project record.

D. Refrigerant Tubing Evacuation Testing:

1. Comply with more stringent of VRF HVAC system manufacturer's requirements and requirements indicated.
2. After completion of tubing positive-pressure testing, evacuate tubing systems to a pressure of 500 microns.
3. Successful testing must maintain a test pressure for a continuous and uninterrupted period of one hour(s) with no change.
4. Prepare test report to record the following information for each test:

a. Name of person starting test, company name, phone number, and e-mail address.
b. Name of manufacturer's service representative witnessing test, company name, phone number, and e-mail address.
c. Detailed description of extent of tubing tested.
d. Date and time at start of test.
e. Test pressure at start of test.
f. Outdoor temperature at start of test.
g. Name of person ending test, company name, phone number, and e-mail address.
h. Date and time at end of test.
i. Test pressure at end of test.
j. Outdoor temperature at end of test.

5. Submit test reports for Project record.
6. Upon successful completion of evacuation testing, system must be charged with refrigerant.

E. System Refrigerant Charge:

1. Using information collected from the refrigerant tubing evacuation testing, system Installer must consult variable refrigerant system manufacturer to determine the correct system refrigerant charge.
2. Installer must charge system following VRF HVAC system manufacturer's written instructions.
3. System refrigerant charging must be witnessed by system manufacturer's representative.
4. Total refrigerant charge must be recorded and permanently displayed at the system's outdoor unit.

F. Products will be considered defective if they do not pass tests and inspections.

G. Prepare test and inspection reports.

3.18 STARTUP SERVICE

A. Engage a VRF HVAC system manufacturer's service representative to perform system(s) startup service.

1. Service representative must be an employee or a factory-trained and -authorized service representative of VRF HVAC system manufacturer.
2. Complete startup service of each separate system.
3. Complete system startup service according to manufacturer's written instructions.

B. Startup checks must include, but not be limited to, the following:

1. Check control communications of equipment and each operating component in system(s).
2. Check each indoor unit's response to demand for cooling and heating.
3. Check each indoor unit's response to changes in airflow settings.
4. Check each indoor unit, HRCU, and outdoor unit for proper condensate removal.
5. Check sound levels of each indoor and outdoor unit.

C. Installer must accompany manufacturer's service representative during startup service and provide manufacturer's service representative with requested documentation and technical support during startup service.

1. Installer must correct deficiencies found during startup service for reverification.

D. System Operation Report:

1. After completion of startup service, manufacturer must issue a report for each separate system.
2. Report must include complete documentation describing each startup check, the result, and any corrective action required.
3. Manufacturer must electronically record not less than two hours of continuous operation of each system and submit with report for historical reference.

a. All available system operating parameters must be included in the information submitted.

E. Witness:

1. Invite Commissioner to witness startup service procedures.
2. Provide written notice not less than 20 business days before start of startup service.

3.19 ADJUSTING

A. Adjust equipment and components to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust initial temperature and humidity set points. Adjust initial airflow settings and discharge airflow patterns.

C. Set field-adjustable switches and circuit-breaker trip ranges according to VRF HVAC system manufacturer's written instructions, and as indicated.

D. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.20 PROTECTION

A. Protect products from moisture and water damage. Remove and replace products that are wet, moisture damaged, or mold damaged.

B. Protect equipment from physical damage. Replace equipment with physical damage that cannot be repaired to new condition. Observable surface imperfections must be grounds for removal and replacement.

C. Protect equipment from electrical damage. Replace equipment suffering electrical damage.

D. Cover and seal openings of equipment to keep inside of equipment clean. Do not remove covers until finish work is complete.

3.21 DEMONSTRATION

A. Engage a VRF HVAC system manufacturer's employed instructor or factory-authorized service representative to instruct City of New York's personnel to adjust and operate entire system.

B. Instructor:

1. Instructor must be factory trained and certified by VRF HVAC system manufacturer on the system(s), equipment, and controls that are installed.
2. Instructor's credentials must be submitted for review by Commissioner before scheduling instruction.
3. Instructor(s) primary job responsibility must be instruction to staff.

C. Schedule and Duration:

1. Schedule instruction at least 20 business days before first session.
2. Instruction must occur before occupancy.
3. Instruction must be held at mutually agreed date and time, and on-site location during normal business hours.

D. Format: Individual modules must include classroom instruction followed by hands-on field demonstration.

E. Materials: Provide instruction materials in electronic format to each attendee.

1. Include instructional videos that are coordinated with operation and maintenance manuals.

F. Video record each instruction session and submit an electronic copy to Commissioner.

G. Acceptance: Obtain Commissioner's written acceptance that instruction is complete and requirements indicated have been satisfied.

END OF SECTION 238129

SECTION 238233 - CONVECTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes electric convectors.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings:

1. Include enclosure joints, corner pieces, access doors, and other accessories.
2. Include diagrams for power, signal, and control wiring.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of the convectors that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 1 year parts from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ELECTRIC CONVECTORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Jaga or comparable product by one of the following:

1. INDEECO.
2. Marley Engineered Products.
3. Or approved equal.

B. Description: Factory-packaged units constructed according to UL 499, UL 1030, and UL 2021.

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Heating Elements: Nickel-chromium-wire heating element enclosed in metallic sheath mechanically bonded to fins, with high-temperature cutout and sensor running the full length of element. Element supports must eliminate thermal expansion noise.

D. Support Brackets: Locate at maximum 36-inch spacing to support front panel and element.

E. Finish: Baked-enamel finish in manufacturer's standard color as selected by Commissioner.

F. Accessories: Integral disconnect switch, recessing flanges finished to match enclosure or overlapping front cover for fully recessed units, and rubber gaskets to seal cabinet at wall.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas to receive convectors for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical connections to verify actual locations before installation of convector.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install convectors level and plumb.

3.4 CONNECTIONS

A. Ground electric convectors according to Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION 238233

SECTION 238236 - FINNED-TUBE RADIATION HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes electric, baseboard radiation heaters.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings:

1. Include enclosure joints, corner pieces, access doors, and other accessories.
2. Include diagrams for power, signal, and control wiring.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of heaters that fail in materials or workmanship within specified warranty period.

1. Warranty Period:1 year part from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ELECTRIC BASEBOARD RADIATION HEATERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Berko; Marley Engineered Products.
2. INDEECO.
3. Marley Engineered Products.
4. QMark; Marley Engineered Products.
5. Or approved equal.

B. Description: Factory-packaged units constructed according to UL 499, UL 1030, and UL 2021.

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Heating Elements: Nickel-chromium-wire heating element enclosed in metallic sheath mechanically bonded to fins, with high-temperature cutout and sensor running the full length of the element. Element supports must eliminate thermal expansion noise.

2.2 ELECTRIC FINNED-TUBE RADIATION HEATERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. INDEECO.
2. Marley Engineered Products.
3. Jaga.

4. Or approved equal.

B. Description: Factory-packaged units constructed according to UL 499, UL 1030, and UL 2021.

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Heating Elements: Nickel-chromium-wire heating element enclosed in metallic sheath mechanically bonded to fins, with high-temperature cutout and sensor running the full length of the element. Element supports must eliminate thermal expansion noise.

D. Support Brackets: Locate at maximum 36-inch spacing to support front panel and element.

E. Finish: Baked-enamel or -epoxy finish in manufacturer's standard color as selected by Commissioner.

F. Accessories: Integral disconnect switch, filler sections, corners, relay sections, and splice plates all matching the enclosure and grille finishes.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas to receive finned-tube radiation heaters for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical connections to verify actual locations before installation of finned-tube radiation heaters.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 BASEBOARD RADIATION HEATER INSTALLATION

A. Install units level and plumb.

B. Install enclosure continuously around corners, using outside and inside corner fittings.

C. Join sections with splice plates and filler pieces to provide continuous enclosure.

D. Terminate enclosures with manufacturer's end caps except where enclosures are indicated to extend to adjoining walls.

3.4 FINNED-TUBE RADIATION HEATER INSTALLATION

A. Install units level and plumb.

B. Install enclosure continuously around corners, using outside and inside corner fittings.

C. Join sections with splice plates and filler pieces to provide continuous enclosure.

D. Terminate enclosures with manufacturer's end caps except where enclosures are indicated to extend to adjoining walls.

3.5 CONNECTIONS

A. Ground electric finned-tube radiation heaters according to Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION 238236

SECTION 238239.16 - PROPELLER UNIT HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes: Propeller unit heaters with electric-resistance heating coils.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, furnished specialties, and accessories.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For propeller unit heaters to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of the heater that fail in materials or workmanship within specified warranty period.

1. Warranty Period:1 year parts from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PROPELLER UNIT HEATERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Stelpro or comparable product by one of the following:

1. Modine
2. Qmark
3. Or approved equal.

2.2 DESCRIPTION

A. Heaters: Assembly including casing, coil, fan, and motor in horizontal discharge configuration with adjustable discharge louvers.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with UL 2021.

D. Comply with UL 823.

2.3 PERFORMANCE REQUIREMENTS

A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

B. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas to receive propeller unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical connections to verify actual locations before unit-heater installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF PROPELLER UNIT HEATERS

A. Install propeller unit heaters to comply with NFPA 90A.

B. Install propeller unit heaters level and plumb.

C. Suspend propeller unit heaters from structure with all-thread hanger rods and spring hangers. Hanger rods and attachments to structure are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment." Vibration hangers are specified in Section 230548.13 "Vibration Controls for HVAC."

D. Install wall-mounted thermostats and switch controls in electrical outlet boxes at heights to match lighting controls. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation.

3.4 CONNECTIONS

A. Comply with safety requirements in UL 1995.

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.5 ADJUSTING

A. Adjust initial temperature set points.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate propeller unit heaters.

END OF SECTION 238239.16

SECTION 238239.19 - WALL AND CEILING UNIT HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes: Wall and ceiling unit heaters with propeller fans and electric-resistance heating coils.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Sustainable Design Submittals:

1. Product Data: For ventilation equipment, indicating compliance with ASHRAE 62.1, Section 5 - "Systems and Equipment."
2. Ventilation: Product Data for ventilation equipment, indicating compliance with ASHRAE 62.1, Section 5 - "Systems and Equipment."

C. Shop Drawings:

1. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Include equipment schedules to indicate rated capacities, operating characteristics, furnished specialties, and accessories.
3. Wiring Diagrams: Power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wall and ceiling unit heaters to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of outdoor, semi-custom, air-handling unit that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 1 year parts from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WALL AND CEILING UNIT HEATERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings as manufactured by Stelpro or comparable product by one of the following:

1. INDEECO.
2. Marley Engineered Products.
3. Jaga.
4. Or approved equal.

B. Heaters: Assembly including chassis, electric heating coil, fan, motor, and controls. Comply with UL 2021.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 CABINET

A. Finish: Baked enamel over baked-on primer with manufacturer's standard color selected by Commissioner, applied to factory-assembled and -tested wall and ceiling heaters before shipping.

2.3 CONTROLS

A. Controls: Unit-mounted thermostat.

B. Electrical Connection: Factory wire motors and controls for a single field connection.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas to receive wall and ceiling unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical connections to verify actual locations before unit-heater installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF WALL AND CEILING UNIT HEATERS

A. Install wall and ceiling unit heaters to comply with NFPA 90A.

B. Install wall and ceiling unit heaters level and plumb.

C. Install wall-mounted thermostats and switch controls in electrical outlet boxes at heights to match lighting controls. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation.

D. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

E. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION 238239.19

SECTION 238413.23 - DIRECT-STEAM-INJECTION HUMIDIFIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Direct-steam-injection distributer tube humidifiers.

1.3 DEFINITIONS

A. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.
2. Product Data: For adhesives, indicating VOC content.
3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
4. Laboratory Test Reports: For insulation, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: Detail fabrication and installation of humidifiers. Include piping details, plans, elevations, sections, details of components, distributer tubes/manifolds, and attachments to other work.

1. Include diagrams for power, signal, and control wiring.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For humidifiers to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 WARRANTY

A. Warranty: Manufacturer agrees to repair or replace components of outdoor, semi-custom, air-handling unit that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 2 year parts from date of Substantial Completion.

1.9 COORDINATION

A. Coordinate location and installation of humidifiers with distributer tubes/manifolds in ducts and plenums or occupied space. Revise locations and elevations to suit field conditions and to ensure proper humidifier operation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with AHRI 640.

C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

2.2 DIRECT-STEAM-INJECTION DISTRIBUTER TUBE HUMIDIFIERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. DRI-STEEM Humidifier Company.
2. Neptronic; National Environmental Products, Inc.
3. Nortec Industries Inc.
4. Or approved equal.

B. Steam Distributer Tube(s): Single or multiple, steam-jacketed tubes suitable for pressurized steam applications.

C. Material: Stainless steel.

D. Insulation: Insulated, minimum R-0.5.

E. Accessories:

1. Humidity Sensor: Wall mounted.
2. Duct-mounted high-limit humidity sensor.
3. Airflow switch for preventing humidifier operation without airflow.
4. Humidifier Controller:

a. Building Automation System Interface:

1) Full Communication Interface: BACnet.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine ducts, air-handling units, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before humidifier installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install humidifiers with required clearance for service and maintenance. Maintain path, downstream from humidifiers, clear of obstructions as required by ASHRAE 62.1.

B. Seal all duct and plenum penetrations with flange.

C. Install humidifier assemblies in metal ducts and casings constructed according to SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."

D. Install stainless-steel drain pan under each manifold mounted in duct.

1. Construct drain pans with connection for drain; insulated and complying with ASHRAE 62.1.
2. Connect to condensate trap and drainage piping.

3. Extend drain pan upstream and downstream from humidifier tube(s)/manifold a minimum distance recommended by manufacturer but not less than that required by ASHRAE 62.1.

E. Install drip leg upstream from steam trap a minimum of 12 inches tall for proper operation of trap.

F. Equipment Mounting:

1. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

G. Install all manufacturer-furnished accessories in accordance with manufacturer's written installation instructions.

3.4 PIPING CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

1. Install piping adjacent to humidifiers to allow service and maintenance.
2. Where condensate drain cooler is used, install shutoff valve, strainer, backflow preventer, and union in tempering water makeup piping.

B. Install piping specialties furnished by manufacturer but not factory mounted.

C. Provide P-trap in atmospheric drain piping serving area humidifiers in accordance with manufacturer recommendations.

3.5 ELECTRICAL CONNECTIONS

A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Locate nameplate where easily visible.

3.6 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring between humidity sensors, high-limit humidity sensors, condensate temperature sensors, and Direct Digital Control system.

C. Connect control wiring between humidistats, thermostats, and control devices.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Humidifier will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 238413.23

SECTION 238416.16 - INDOOR, MECHANICAL DEHUMIDIFICATION UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Indoor, mechanical dehumidification units.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Sustainable Design Submittals:

1. Product Data: For energy performance.
2. Product data showing compliance with ASHRAE 62.1.
3. Product Data: For adhesives, indicating VOC content.
4. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
5. Laboratory Test Reports: For insulation, indicating compliance with requirements for low-emitting materials.
6. Refrigerant: Product Data for refrigerants, indicating compliance with refrigerant management practices.

C. Shop Drawings: For each indoor, mechanical dehumidification unit.

1. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Include diagrams for power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For dehumidification units to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases. Cast anchor-bolt inserts into bases.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of indoor, mechanical dehumidification units that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Compressors: Manufacturer's standard, but not less than two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1.

C. ASHRAE 62.1 Compliance: Section 5, "Systems and Equipment" and Section 7, "Construction and System Start-up."

D. ASHRAE 15 Compliance: "Safety Standard for Refrigeration Systems."

2.2 INDOOR, MECHANICAL DEHUMIDIFICATION UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. DryAire Systems.
2. Dristeem.
3. April Aire.
4. Or approved equal.

B. Filters:

1. Pleated:

a. Thickness: Manufacturer's standard depth.
b. MERV Rating: MERV 6, according to ASHRAE 52.2.

C. Refrigeration System:

1. Energy Efficiency: Equal to or greater than prescribed by ASHRAE/IES 90.1.
2. Compressors: Hermetic, scroll compressors with integral vibration isolators and crankcase heaters that de-energize during compressor operation; with thermal-expansion valves, filter-dryers, sight glasses, compressor service valves, and liquid- and suction-line service valves.

a. Refrigerant: R-410A.
b. Capacity Control:

1) Cycle compressor.

D. Controls:

1. Comply with requirements in Section 230923 "Direct Digital Control (DDC) System for HVAC" for control equipment and in Section 230993.11 "Sequence of Operations for HVAC Direct Digital Control."
2. Interface with Direct Digital Control System for HVAC: Factory-installed hardware and software to enable the Direct Digital Control system for HVAC to monitor, control, and display status and alarms.

2.3 MATERIALS

A. Steel:

1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for steel sheet.

B. Stainless Steel:

1. Manufacturer's standard grade for casing.
2. Manufacturer's standard type, ASTM A240/240M for bare steel exposed to airstream or moisture.

C. Galvanized Steel: ASTM A653/A653M.

D. Aluminum: ASTM B209.

E. Comply with Section 230546 "Coatings for HVAC" for corrosion-resistant coating.

F. Corrosion-Resistant Coating: Coat with a corrosion-resistant coating capable of withstanding a 3,000 -hour salt-spray test according to ASTM B117.

1. Standards:

a. ASTM B117 for salt spray.
b. ASTM D2794 for minimum impact resistance of 100 in/lb.
c. ASTM B3359 for cross hatch adhesion of 5B.

2.4 SOURCE QUALITY CONTROL

A. Verification of Performance: Factory test and rate dehumidification units according to AHRI 910.

B. Sound-Power-Level Ratings: Factory test and rate dehumidification units according to AHRI 575.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine walls, floors, and roofs for suitable conditions where dehumidification units will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF INDOOR, MECHANICAL DEHUMIDIFICATION UNITS

A. Equipment Mounting:

1. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

3.4 PIPING CONNECTIONS

A. Where piping is installed adjacent to dehumidification units, allow space for service and maintenance of dehumidification units.

B. Connect piping to dehumidification units mounted on vibration isolators with flexible connectors.

C. Connect condensate drain pans using minimum NPS 1-1/4 copper tubing. Extend to nearest equipment or floor drain. Construct deep trap at connection to drain pan, and install cleanout at changes in direction.

3.5 ELECTRICAL CONNECTIONS

A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate must be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.
3. Locate nameplate where easily visible.

3.6 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring between control devices.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Dehumidification unit will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.8 CLEANING

A. Clean dehumidification units internally, on completion of installation, according to manufacturer's written instructions. Clean fan interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheels, cabinets, and coils' entering-air face.

B. After completing system installation, testing, and startup service of dehumidification units, clean filter housings and install new filters.

3.9 ADJUSTING

A. Adjust initial temperature and humidity set points.

3.10 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

B. Perform the following final checks before startup:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Perform cleaning and adjusting specified in this Section.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify free fan wheel rotation and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.
5. Check lubrication of bearings, pulleys, belts, and other moving parts.
6. Install clean filters.

C. Starting procedures for dehumidification units include the following:

1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm. Replace malfunctioning motors, bearings, and fan wheels.

D. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing of dehumidification unit.

E. Startup Report: Report findings during startup. Identify startup steps, corrective measures taken, and final results.

END OF SECTION 238416.16

SECTION 260010 - SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. This Section specifies supplemental requirements generally applicable to the Work specified in Division 26. This Section is also referenced by related Work specified in other Divisions.

1.3 REFERENCES

A. Abbreviations and Acronyms for Electrical Terms and Units of Measure:

1. 8P8C: An 8-position 8-contact modular jack.
2. A: Ampere, unit of electrical current.
3. AC or ac: Alternating current.
4. AFCI: Arc-fault circuit interrupter.
5. AIC: Ampere interrupting capacity.
6. AL, Al, or ALUM: Aluminum.
7. ASD: Adjustable-speed drive; also called "variable-frequency drive" (VFD).
8. AWG: American wire gauge; see ASTM B258.
9. BAS: Building automation system.
10. BIM: Building information modeling.
11. CAD: Computer-aided design or drafting.
12. CATV: Community antenna television.
13. CB: Circuit breaker.
14. cd: Candela, the SI fundamental unit of luminous intensity.
15. CO/ALR: Copper-aluminum, revised.
16. CU or Cu: Copper.
17. CU-AL or AL-CU: Copper-aluminum.
18. dB: Decibel, a unitless logarithmic ratio of two electrical, acoustical, or optical power values.
19. dB(A-weighted) or dB(A): Decibel acoustical sound pressure level with A-weighting applied in accordance with IEC 61672-1.
20. dB(adjusted) or dBa: Decibel weighted absolute noise power with respect to 3.16 pW (minus 85 dBm).
21. dBm: Decibel absolute power with respect to 1 mW.
22. DC or dc: Direct current.
23. DCOA: Designated critical operations area.
24. DDC: Direct digital control (HVAC).
25. EGC: Equipment grounding conductor.
26. EMF: Electromotive force.

27. EMI: Electromagnetic interference.
28. EPM: Electrical preventive maintenance.
29. EV: Electric vehicle.
30. EVPE: Electric vehicle power export equipment.
31. EVSE: Electric vehicle supply equipment.
32. fc: Footcandle, an internationally recognized unit of illuminance equal to one lumen per square foot or 10.76 lx. The simplified conversion 1 fc = 10 lx in the Specifications is common practice and considered adequate precision for building construction activities. When there are conflicts, lux is the primary unit; footcandle is specified for convenience.
33. FLC: Full-load current.
34. ft: Foot.
35. ft-cd: Foot-candle, the antiquated U.S. Standard unit of illuminance, equal to one international candle measured at a distance of one foot, that was superseded in 1948 by the unit "footcandle" after the SI unit candela (cd) replaced the international candle; see "fc,"
36. GEC: Grounding electrode conductor.
37. GFCI: Ground-fault circuit interrupter.
38. GFPE: Ground-fault protection of equipment.
39. GND: Ground.
40. HACR: Heating, air conditioning, and refrigeration.
41. HDPE: High-density polyethylene.
42. HID: High-intensity discharge.
43. HP or hp: Horsepower.
44. HVAC: Heating, ventilating, and air conditioning.
45. Hz: Hertz.
46. IBT: Intersystem bonding termination.
47. inch: Inch. To avoid confusion, the abbreviation "in." is not used.
48. IP: Ingress protection rating (enclosures); Internet protocol (communications).
49. IR: Infrared.
50. IS: Intrinsically safe.
51. IT&R: Inspecting, testing, and repair.
52. ITE: Information technology equipment.
53. kAIC: Kiloampere interrupting capacity.
54. kcmil or MCM: One thousand circular mils.
55. kV: Kilovolt.
56. kVA: Kilovolt-ampere.
57. kVAr or kVAR: Kilovolt-ampere reactive.
58. kW: Kilowatt.
59. kWh: Kilowatt-hour.
60. LAN: Local area network.
61. lb: Pound (weight).
62. lbf: Pound (force).
63. LCD: Liquid-crystal display.
64. LCDI: Leakage-current detector-interrupter.
65. LED: Light-emitting diode.
66. Li-ion: Lithium-ion.
67. lm: Lumen, the SI derived unit of luminous flux.
68. LRC: Locked-rotor current.
69. LV: Low voltage.
70. lx: Lux, the SI derived unit of illuminance equal to one lumen per square meter.
71. m: Meter.
72. MCC: Motor-control center.

73. MDC: Modular data center.
74. MIDI: Musical instrument digital interface.
75. MLO: Main lugs only.
76. mW: Milliwatt.
77. MW: Megawatt.
78. MWh: Megawatt-hour.
79. NC: Normally closed.
80. Ni-Cd: Nickel-cadmium.
81. Ni-MH: Nickel-metal hydride.
82. NIU: Network interface unit.
83. NO: Normally open.
84. NPT: National (American) standard pipe taper.
85. OCPD: Overcurrent protective device.
86. ONT: Optical network terminal.
87. PC: Personal computer.
88. PCS: Power conversion system.
89. PCU: Power-conditioning unit.
90. PF or pf: Power factor.
91. PHEV: Plug-in hybrid electric vehicle.
92. PLC: Programmable logic controller.
93. PLFA: Power-limited fire alarm.
94. PoE: Power over Ethernet.
95. PV: Photovoltaic.
96. PVC: Polyvinyl chloride.
97. pW: Picowatt.
98. RFI: (electrical) Radio-frequency interference; (contract) Request for interpretation.
99. RMS or rms: Root-mean-square.
100. RPM or rpm: Revolutions per minute.
101. SCADA: Supervisory control and data acquisition.
102. SCR: Silicon-controlled rectifier.
103. SPD: Surge protective device.
104. sq.: Square.
105. SWD: Switching duty.
106. TCP/IP: Transmission control protocol/Internet protocol.
107. TEFC: Totally enclosed fan-cooled.
108. TR: Tamper resistant.
109. TVSS: Transient voltage surge suppressor.
110. UL: (standards) Underwriters Laboratories, Inc.; (product categories) UL, LLC.
111. UL CCN: UL Category Control Number.
112. UPS: Uninterruptible power supply.
113. USB: Universal serial bus.
114. UV: Ultraviolet.
115. V: Volt, unit of electromotive force.
116. V(ac): Volt, alternating current.
117. V(dc): Volt, direct current.
118. VA: Volt-ampere, unit of complex electrical power.
119. VAR: Volt-ampere reactive, unit of reactive electrical power.
120. VFC: Variable-frequency controller.
121. VOM: Volt-ohm-multimeter.
122. VPN: Virtual private network.

123. VRLA: Valve regulated lead acid; also called "sealed lead acid (SLA)" or "valve regulated sealed lead acid."
124. W: Watt, unit of real electrical power.
125. Wh: Watt-hour, unit of electrical energy usage.
126. WR: Weather resistant.

B. Abbreviations and Acronyms for Electrical Raceway Types:

1. CR: Communications raceway.
2. EMT: Electrical metallic tubing.
3. EMT-A: Aluminum electrical metallic tubing.
4. EMT-S: Steel electrical metallic tubing.
5. EMT-SS: Stainless steel electrical metallic tubing.
6. ERMC: Electrical rigid metal conduit.
7. ERMC-A: Aluminum electrical rigid metal conduit.
8. ERMC-S: Steel electrical rigid metal conduit.
9. ERMC-S-G: Galvanized-steel electrical rigid metal conduit.
10. ERMC-SS: Stainless steel electrical rigid metal conduit.
11. FMC: Flexible metal conduit.
12. FMC-A: Aluminum flexible metal conduit.
13. FMC-S: Steel flexible metal conduit.
14. FMT: Steel flexible metallic tubing.
15. IMC: Steel electrical intermediate metal conduit.
16. LFMC: Liquidtight flexible metal conduit.
17. LFMC-A: Aluminum liquidtight flexible metal conduit.
18. LFMC-S: Steel liquidtight flexible metal conduit.
19. LFMC-SS: Stainless steel liquidtight flexible metal conduit.
20. LFNC: Liquidtight flexible nonmetallic conduit.
21. LFNC-A: Layered (Type A) liquidtight flexible nonmetallic conduit.
22. LFNC-B: Integral (Type B) liquidtight flexible nonmetallic conduit.
23. LFNC-C: Corrugated (Type C) liquidtight flexible nonmetallic conduit.
24. RGS: See ERMC-S-G.
25. RMC: See ERMC.
26. RTRC: Reinforced thermosetting resin conduit.
27. RTRC-BG: Low-halogen, belowground reinforced thermosetting resin conduit.

C. Abbreviations and Acronyms for Electrical Single-Conductor and Multiple-Conductor Cable Types:

1. FPL: Power-limited fire-alarm cable.
2. FPLP: Power-limited fire-alarm plenum cable.
3. FPLR: Power-limited fire-alarm riser cable.
4. MC: Metal-clad cable.
5. NPLF: Non-power-limited fire-alarm circuit cable.
6. NPLFP: Non-power-limited fire-alarm circuit cable for environmental air spaces.
7. NPLFR: Non-power-limited fire-alarm circuit riser cable.
8. NUCC: Nonmetallic underground conduit with conductors.
9. PV: Photovoltaic cable.
10. THW: Thermoplastic, heat- and moisture-resistant cable.
11. THHN: Thermoplastic, heat-resistant cable with nylon jacket outer sheath.
12. THHW: Thermoplastic, heat- and moisture-resistant cable.
13. THWN: Thermoplastic, moisture- and heat-resistant cable with nylon jacket outer sheath.

14. TW: Thermoplastic, moisture-resistant cable.
15. UF: Underground feeder and branch-circuit cable.

D. Definitions:

1. 8-Position 8-Contact (8P8C) Modular Jack: An unkeyed jack with up to eight contacts commonly used to terminate twisted-pair and multiconductor Ethernet cable. Also called a "TIA-1096 miniature 8-position series jack" (8PSJ), or an "IEC 8877 8-pole jack."

    a. Be careful when suppliers use "RJ45" generically. Obsolete RJ45 jacks used for analog telephone cables have rejection keys. 8P8C jacks used for digital telephone cables and Ethernet cables do not have rejection keys.

2. Basic Impulse Insulation Level (BIL): Reference insulation level expressed in impulse crest voltage with a standard wave not longer than 1.5 times 50 microseconds and 1.5 times 40 microseconds.
3. Cable: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "cable" is (1) a conductor with insulation, or a stranded conductor with or without insulation (single-conductor cable); or (2) a combination of conductors insulated from one another (multiple-conductor cable).
4. Communications Jack: A fixed connecting device designed for insertion of a communications cable plug.
5. Communications Outlet: One or more communications jacks, or cables and plugs, mounted in a box or ring, with a suitable protective cover.
6. Conductor: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "conductor" is (1) a wire or combination of wires not insulated from one another, suitable for carrying an electric current; (2) (National Electrical Safety Code) a material, usually in the form of wire, cable, or bar, suitable for carrying an electric current; or (3) (general) a substance or body that allows a current of electricity to pass continuously along it.
7. Direct Buried: Installed underground without encasement in concrete or other protective material.
8. Enclosure: The case or housing of an apparatus, or the fence or wall(s) surrounding an installation, to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. Types of enclosures and enclosure covers include the following:

    a. Cabinet: An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.
    b. Concrete Box: A box intended for use in poured concrete.
    c. Conduit Body: A means for providing access to the interior of a conduit or tubing system through one or more removable covers at a junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
    d. Conduit Box: A box having threaded openings or knockouts for conduit, EMT, or fittings.
    e. Cutout Box: An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure.
    f. Device Box: A box with provisions for mounting a wiring device directly to the box.
    g. Extension Ring: A ring intended to extend the sides of an outlet box or device box to increase the box depth, volume, or both.
    h. Floor Box: A box mounted in the floor intended for use with a floor box cover and other components to complete the floor box enclosure.
    i. Floor-Mounted Enclosure: A floor box and floor box cover assembly with means to mount in the floor that is sealed against the entrance of scrub water at the floor level.

j. Floor Nozzle: An enclosure used on a wiring system, intended primarily as a housing for a receptacle, provided with a means, such as a collar, for surface-mounting on a floor, which may or may not include a stem to support it above the floor level, and is sealed against the entrance of scrub water at the floor level.
k. Junction Box: A box with a blank cover that joins different runs of raceway or cable and provides space for connection and branching of the enclosed conductors.
l. Outlet Box: A box that provides access to a wiring system having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for the entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting an outlet box cover, but without provisions for mounting a wiring device directly to the box.
m. Pedestal Floor Box Cover: A floor box cover that, when installed as intended, provides a means for typically vertical or near-vertical mounting of receptacle outlets above the floor's finished surface.
n. Pull Box: A box with a blank cover that joins different runs of raceway and provides access for pulling or replacing the enclosed cables or conductors.
o. Recessed Access Floor Box: A floor box with provisions for mounting wiring devices below the floor surface.
p. Recessed Access Floor Box Cover: A floor box cover with provisions for passage of cords to recessed wiring devices mounted within a recessed floor box.
q. Ring: A sleeve, which is not necessarily round, used for positioning a recessed wiring device flush with the plaster, concrete, drywall, or other wall surface.
r. Ring Cover: A box cover, with raised center portion to accommodate a specific wall or ceiling thickness, for mounting wiring devices or luminaires flush with the surface.
s. Termination Box: An enclosure designed for installation of termination base assemblies consisting of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors, or both.

9. Emergency Systems: Those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by New York City that are designed to ensure continuity of lighting, electrical power, or both, to designated areas and equipment in the event of failure of the normal supply for safety to human life.
10. Fault Limited: Providing or being served by a source of electrical power that is limited to not more than 100 W when tested in accordance with UL 62368-1.

    a. The term "fault limited" is intended to encompass most Class 1, 2, and 3 power-limited sources complying with Article 725 of NFPA 70; Class ES1 and ES2 electrical energy sources that are Class PS1 electrical power sources (e.g., USB); and Class ES3 electrical energy sources that are Class PS1 and PS2 electrical power sources (e.g., PoE). See UL 62368-1 for discussion of classes of electrical energy sources and classes of electrical power sources.

11. High-Performance Building: A building that integrates and optimizes on a life-cycle basis all major high-performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.
12. Jacket: A continuous nonmetallic outer covering for conductors or cables.
13. Luminaire: A complete lighting unit consisting of a light source such as a lamp, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light.
14. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the Energy Independence and Security Act (EISA) of 2007.
15. Multi-Outlet Assembly: A type of surface, flush, or freestanding raceway designed to hold conductors, receptacles, and switches, assembled in the field or at the factory.

16. Plenum: A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.
17. Receptacle: A fixed connecting device arranged for insertion of a power cord plug. Also called a power jack.
18. Receptacle Outlet: One or more receptacles mounted in a box with a suitable protective cover.
19. Sheath: A continuous metallic covering for conductors or cables.
20. UL Category Control Number (CCN): An alphabetic or alphanumeric code used to identify product categories covered by UL's Listing, Classification, and Recognition Services.
21. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:

    a. Control Voltage: Having electromotive force between any two conductors, or between a single conductor and ground, that is supplied from a battery or other Class 2 or Class 3 power-limited source.
    b. Line Voltage: (1) (controls) Designed to operate using the supplied low-voltage power without transformation. (2) (transmission lines, transformers, SPDs) The line-to-line voltage of the supplying power system.
    c. Extra-Low Voltage (ELV): Not having electromotive force between any two conductors, or between a single conductor and ground, exceeding 30 V(ac rms), 42 V(ac peak), or 60 V(dc).
    d. Low Voltage (LV): Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 30 V but not exceeding 1000 V.
    e. Medium Voltage (MV): Having electromotive force between any two conductors, or between a single conductor and ground, that is rated about 1 kV but not exceeding 69 kV.
    f. High Voltage: (1) (circuits) Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 69 kV but not exceeding 230 kV. (2) (safety) Having sufficient electromotive force to inflict bodily harm or injury.

22. Wire: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "wire" is a slender rod or filament of drawn metal. A group of small wires used as a single wire is properly called a "stranded wire." A wire or stranded wire covered with insulation is properly called an "insulated wire" or a "single-conductor cable." Nevertheless, when the context indicates that the wire is insulated, the term "wire" will be understood to include the insulation.

1.4 COORDINATION

A. Arrange to provide temporary electrical service in accordance with requirements in DDC General Conditions, Section 015000 "Temporary Facilities, Services, and Controls."

1.5 PREINSTALLATION MEETINGS

A. Electrical Preconstruction Conference: Schedule conference with Commissioner not later than 10 days after notice to proceed. Agenda topics include, but are not limited to, the following:

1. Electrical installation schedule.
2. Status of power system studies.
3. Utility work coordination and class of service requests.
4. Commissioning activities.
5. Sustainability activities, including Measurement and Verification Plan.

1.6 SEQUENCING

A. Conduct and submit results of power system studies before submitting Product Data and Shop Drawings for electrical equipment.

1.7 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.8 ACTION SUBMITTALS

A. Coordination drawings, as described in "Preparation" Article in Part 3.

1.9 INFORMATIONAL SUBMITTALS

A. Electrical installation schedule, as described in "Preparation" Article in Part 3.

1.10 CLOSEOUT SUBMITTALS

A. Facility EPM program binders.

B. Operation and maintenance data.

1.11 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Qualifications: Prepare and submit qualification statements for the following entities performing Work on Project:

1. EVSE Installers: Installer possessing active qualifications specified in DDC General Conditions Section 014000 "Quality Requirements," and able to present unexpired certified Installer credentials issued by EVSE manufacturer prior to starting installation.
2. Low-Voltage Electrical Testing and Inspecting Agency: Entities possessing active credentials from a qualified electrical testing laboratory.
3. Outdoor Pole Testing and Inspecting Agency: Entity possessing active qualifications specified in DDC General Conditions Section 014000 "Quality Requirements" with documented training and experience in accordance with ASTM C1093 for foundation testing and inspections.

PART 2 - PRODUCTS (*not used*)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Electrical Installation Schedule: At preconstruction meeting, and periodically thereafter as dates change, provide schedule for electrical installation Work to Commissioner including, but not limited to, milestone dates for the following activities:

1. Submission of power system studies.
2. Submission of specified coordination drawings.
3. Submission of action submittals specified in Division 26.
4. Orders placed for major electrical equipment.
5. Arrival of major electrical equipment on-site.
6. Preinstallation meetings specified in Division 26.
7. Utility service outages.
8. Utility service inspection and activation.
9. Mockup reviews.
10. Closing of walls and ceilings containing electrical Work.
11. System startup, testing, and commissioning activities for major electrical equipment.
12. System startup, testing, and commissioning activities for emergency lighting.
13. System startup, testing, and commissioning activities for automation systems (SCADA, BMS, lighting, HVAC, fire alarm, fire pump, etc.).
14. Pouring of concrete housekeeping pads for electrical equipment and testing of concrete samples.
15. Requests for special inspections.

B. Coordination Drawings for Structural Supports: Show coordination of structural supports for equipment and devices, including restraints and bracing for control of seismic and wind loads, with other systems, equipment, and structural supports in the vicinity.

C. Coordination Drawings for Ceiling Areas: Where indicated on Drawings, provide reflected ceiling plan(s), supplemented by sections and other details, drawn to scale, in accordance with DDC General Conditions Section 013300 "Submittal Procedures" on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which equipment, luminaires, and suspension systems will be attached.
3. Partitions and millwork that penetrate ceiling or extend to within 12 inch of plane of luminaires.
4. Size and location of access panels on ceilings.
5. Elevation, size, and route of sprinkler piping.
6. Elevation, size, and route of plumbing piping.
7. Elevation, size, and route of ductwork.

8. Elevation, size, and route of conduit.
9. Elevation and size of wall-mounted and ceiling-mounted equipment.
10. Access panels.
11. Sprinklers.
12. Air inlets and outlets.
13. Control modules.
14. Luminaires.
15. Fire-alarm devices.
16. Indicate clear dimensions for maintenance access in front of equipment.
17. Indicate dimensions of fully-open access doors.

D. Coordination Drawings for Conduit Routing: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

E. Coordination Drawings for Large Equipment Indoor Installations:

1. Location plan, drawn to scale, showing heavy equipment or truck access paths to loading dock or other freight access into building. Indicate available width and height of doors or openings.
2. Floor plan for entry floor and floor where equipment is located, drawn to scale, showing heavy equipment access paths for maintenance and replacement, with the following items shown and coordinated with each other, based on input from installers of the items involved:

    a. Dimensioned concrete bases, outlines of equipment, conduit entries, and grounding equipment locations.
    b. If freight elevator must be used, indicate width and height of door and depth of car. Indicate if large equipment must be tipped to use elevator.
    c. Dimensioned working clearances and dedicated areas below and around electrical equipment where obstructions and tripping hazards are prohibited.

3. Reflected ceiling plans for entry floor and floor where equipment is located, drawn to scale, on which the following items shown and coordinated with each other, based on input from installers of the items involved:

    a. Support locations, type of support, and weight on each support. Locate structural supports for structure-supported raceways, busways,.
    b. Location of lighting fixtures, sprinkler piping and sprinklers, ducts and diffusers, and other obstructions, indicating available overhead clearance.
    c. Dimensioned working clearances and dedicated areas above and around electrical equipment where foreign systems and equipment are prohibited.

F. Coordination Drawings for Large Equipment Outdoor Installations:

1. Utilities site plan, drawn to scale, showing heavy equipment or truck access paths for maintenance and replacement, with the following items shown and coordinated with each other, based on input from installers of the items involved:

a. Fences and walls, dimensioned concrete bases, outlines of equipment, conduit entries, and grounding and bonding locations.
b. Indicate clear dimensions for fence gates and wall openings.
c. Indicate depth and type of ground cover, and locations of trees, shrubbery, and other obstructions in access path.
d. Indicate clear height below tree branches, overhead lines, bridges, and other overhead obstructions in access path, or where cranes and hoists will be needed to handle large electrical equipment.
e. Support locations, type of support, and weight on each support. Locate structural supports for structure-supported raceways, busways,.
f. Dimensioned working clearances and dedicated areas around electrical equipment.

G. Coordination Drawings for Duct Banks:

1. Show duct profiles and coordination with other utilities and underground structures.
2. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.

3.3 INSTALLATION OF ELECTRICAL WORK

A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' written instructions, comply with NFPA 70 and NECA NEIS 1 for installation of Work specified in Division 26. Consult Commissioner for resolution of conflicting requirements.

3.4 FIELD QUALITY CONTROL

A. Administrant for Low-Voltage Electrical Tests and Inspections:

1. Engage qualified low-voltage electrical testing and inspecting agency to administer and perform tests and inspections.
2. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
3. Administer and perform tests and inspections with assistance of factory-authorized service representative.

B. Administrant for Power-Limited Electrical Tests and Inspections:

1. Engage qualified power-limited electrical testing and inspecting agency to administer and perform tests and inspections.
2. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
3. Administer and perform tests and inspections with assistance of factory-authorized service representative.

C. Administrant for Field Tests and Inspections of Lighting Installations:

1. Engage qualified lighting testing and inspecting agency to administer and perform tests and inspections.
2. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

3. Administer and perform tests and inspections with assistance of factory-authorized service representative.

3.5 CLOSEOUT ACTIVITIES

A. Development of Facility EPM Program

1. Compile operation and maintenance data from Facility EPM Program analysis and submit Facility EPM Program Binders.
2. Organization of Facility EPM Program Binders:

a. Description: Set of binders containing operation and maintenance data for facility's electrical equipment that was compiled during analysis of installed electrical Work for Facility EPM Program development.
b. Referenced Standards: Content must comply with recommendations in NFPA 70B.
c. General Characteristics:

1) Volume 1 - Introduction:

a) Summarize how Facility EPM Program Analysis was performed, how data were collected, and how volumes are organized.
b) Describe Facility EPM Program and provide recommended policies and procedures for implementing the program and keeping it current.
c) Provide place for City of New York to identify contact information for employees responsible for implementing Facility EPM Program.

2) Volume 2 - Facility Safety, Hazards Awareness, and Emergency Procedures:

a) Include instructing requirements for employees and contractors.
b) Include list of known facility hazards impacting IT&R activities.
c) Include approval and permitting procedures for IT&R activities.
d) Include incident emergency response procedures.
e) Include emergency shutdown procedures.
f) Include electrical disaster recovery procedures.

3) Volume 3 - Operating Procedures for Electrical Equipment and Controls:

a) Include copies of demonstration and instruction videos.

4) Volume 4 - Facility Diagrams and Schedules:

a) Include single-line diagrams.
b) Include grounding and bonding diagrams.
c) Include essential wiring diagrams.
d) Include system communications diagrams (WAN, LAN, Wi-Fi, ERCES, MNS, etc.)
e) Include system automation diagrams (SCADA, BMS, lighting, HVAC, etc.).
f) Include records of switchgear, switchboard, and panelboard schedules.
g) Include time-current curves for overcurrent protective devices.
h) Include list of load-current and overload-relay heaters with related motor nameplate data.

5) Volume 5 - Inventory of Facility Equipment Using Electrical Power:

a) Include simplified floor plans showing equipment locations.
b) Identify critical equipment (electrical or otherwise).
c) Include identifying designations and nameplate data.
d) Include warranty information.

6) Volume 6 - Inventory of Facility Tools, Supplies, and Personnel Protective Equipment:

a) Include schedules of maintenance material items recommended to be stored at facility.
b) Include list of lamp types and photoelectric relays used in facility with ANSI and manufacturers' codes.
c) Include calibration and servicing data for each item.

7) Volume 7 - Inspection, Testing, and Repair (IT&R) Plan:

a) Include tables showing frequency of activities for each item.
b) Include annual schedule with activities mapped to specific days of the year.
c) Include exterior pole inspection and repair procedures.

8) Volume 11 - Construction Project Closeout Record Documentation:

a) Include records of power system studies and photometric studies.
b) Include records of risk assessment studies.
c) Include records of electrical system startup and commissioning activities.
d) Include records of baseline inspections and tests.
e) Include records of baseline infrared photographs with normal light photographs showing the location, direction, angle, and conditions necessary for reproducing each infrared photograph.
f) Include records of baseline settings for adjustable equipment and devices.

3. Format of Facility EPM Program Binders Submittal:

a. Complete Set: On USB media that is clearly and permanently labeled with attached placard on lanyard to prevent misplacement.
b. Volumes 2 and 8: Reproducible hardcopy on archival quality, 28 lb, acid-free, bond paper.

B. Operation and Maintenance Data: Prepare and submit the following:

1. Include the following information:

a. Manufacturer's operating specifications.
b. User's guides for software and hardware.
c. Schedule of maintenance material items recommended to be stored at Project site.
d. Detailed instructions covering operation under both normal and abnormal conditions.
e. Time-current curves for overcurrent protective devices and manufacturer's written instructions for testing and adjusting their settings.
f. List of load-current and overload-relay heaters with related motor nameplate data.

g. List of lamp types and photoelectric relays used on Project, with ANSI and manufacturers' codes.
h. Manufacturer's instructions for setting field-adjustable components.
i. Manufacturer's instructions for testing, adjusting, and reprogramming microprocessor controls.
j. EPSS: Manufacturer's system checklists, maintenance schedule, and maintenance log sheets in accordance with NFPA 110.
k. Exterior pole inspection and repair procedures.
l. Include copies of demonstration and instruction videos.

C. Software and Firmware Operational Documentation: Provide software and firmware operational documentation in Facility EPM Program Binders, including the following:

1. Software operating and upgrade manuals.
2. Names, versions, and website addresses for locations of installed software.
3. Device address list.
4. Printout of software application and graphic screens.
5. Testing and adjusting of panic and emergency power features.
6. For lighting controls, include the following:

a. Adjustments of scene preset controls, adjustable fade rates, and fade overrides.
b. Operation of adjustable zone controls.

D. Software:

1. Program Software Backup: Provide USB media that is clearly and permanently labeled with attached placard on lanyard to prevent misplacement.
2. Provide to City of New York upgrades and unrestricted licenses for Government use for installed and backup software, including operating systems and programming tools required for operation.

E. Demonstration: With assistance from factory-authorized service representatives, demonstrate to City of New York's personnel how to operate the following systems and equipment:

1. Lighting control devices specified in Section 260923 "Lighting Control Devices."

F. Instruction:With assistance from factory-authorized service representatives, instruct City of New York's personnel on the following topics:

1. How to implement updated Facility EPM Program.
2. How to adjust and operate devices specified in Section 260923 "Lighting Control Devices."
3. How to adjust and operate switchboards, overcurrent protective devices, instrumentation, and accessories, and to use and reprogram microprocessor-based trip, monitoring, and communication units specified in Section 262413 "Switchboards."
4. How to adjust and operate equipment specified in Section 263100 "Photovoltaic Collectors."
5. How to adjust and operate luminaires and photoelectric controls specified in Section 265000 "Lighting."

END OF SECTION 260010

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUIMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Copper building wire.
2. Metal-clad cable, Type MC.
3. Photovoltaic cable, Type PV.
4. Fire-alarm wire and cable.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Copper building wire.
2. Metal-clad cable, Type MC.
3. Photovoltaic cable, Type PV.
4. Fire-alarm wire and cable.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 ASTM B496 for stranded conductors.

D. Conductor Insulation:

2.2 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Circuits:

1. Single circuit multicircuit with color-coded conductors.

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

E. Ground Conductor: Insulated.

F. Conductor Insulation:

1. Type TFN/THHN/THWN-2. Comply with UL 83.

G. Armor: Aluminum, interlocked.

H. Jacket: PVC applied over armor.

2.3 PHOTOVOLTAIC CABLE, TYPE PV

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 2000 V.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

D. Conductor Insulation: Comply with UL 44 and UL 4703.

2.4 FIRE-ALARM WIRE AND CABLE

A. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

B. Signaling Line Circuits: Twisted, shielded pair, not less than size as recommended by system manufacturer.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire-alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a two-hour rating.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders:

1. Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
2. Copper for feeders smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger. Conductors must be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits:

1. Copper:

a. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

b. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

C. ASD Output Circuits Cable: Extra-flexible stranded for all sizes.

D. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

E. PV Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.3 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN/THWN-2, single conductors in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Metal-clad cable, Type MC.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

E. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

H. PV Circuits, Type PV: For PV source circuits rated at 2000 V.

3.4 INSTALLATION, GENERAL

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points in accordance with Section 260533.13 "Conduits for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.5 INSTALLATION OF FIRE-ALARM WIRE AND CABLE

A. Comply with NFPA 72.

B. Wiring Method: Install wiring in metal pathway according to Section 260529 "Hangers and Supports for Electrical Systems."

1. Install plenum cable in environmental airspaces, including plenum ceilings.
2. Fire-alarm circuits and equipment control wiring associated with fire-alarm system must be installed in a dedicated pathway system.

   a. Cables and pathways used for fire-alarm circuits, and equipment control wiring associated with fire-alarm system, may not contain any other wire or cable.

3. Signaling Line Circuits: Power-limited fire-alarm cables must not be installed in the same cable or pathway as signaling line circuits.

C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire-alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes; cabinets; or equipment enclosures where circuit connections are made.

E. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.

F. Risers: Install at least two vertical cable risers to serve the fire-alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent receipt or transmission of signals from other floors or zones.

G. Wiring to Remote Alarm Transmitting Device: 1 inch conduit between the fire-alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.6 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inch of slack.

D. Comply with requirements in Section 284621.11 "Addressable Fire-Alarm Systems" for connecting, terminating, and identifying wires and cables.

3.7 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.8 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.9 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
2. Perform each of the following visual and electrical tests:

   a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
   b. Test bolted connections for high resistance using one of the following:

      1) A low-resistance ohmmeter.
      2) Calibrated torque wrench.
      3) Thermographic survey.

   c. Inspect compression-applied connectors for correct cable match and indentation.
   d. Inspect for correct identification.
   e. Inspect cable jacket and condition.
   f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500 V(dc) for 300 V rated cable and 1000 V(dc) for 600 V rated cable for a one-minute duration.
   g. Continuity test on each conductor and cable.
   h. Uniform resistance of parallel conductors.

3. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

4. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.

B. Cables will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Grounding and bonding conductors.
2. Grounding and bonding clamps.
3. Grounding and bonding bushings.
4. Grounding and bonding hubs.
5. Grounding and bonding connectors.
6. Intersystem bonding bridge grounding connector.
7. Grounding and bonding busbars.
8. Grounding (earthing) electrodes.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" specifies additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Plans showing dimensioned locations of grounding features described in "Field Quality Control for Grounding and Bonding of Electrical Power" Article, including the following:

1. Grounding electrode access enclosures.
2. Grounding electrodes.
3. Grounding arrangements and connections for separately derived systems.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. In addition to items specified in Section 260010 "Supplemental Requirements for Electrical," include the following:

a. Plans showing locations of grounding features described in "Field Quality Control for Grounding and Bonding of Electrical Power" Article, including the following:

1) Grounding electrode access enclosures.
2) Grounding electrodes.
3) Grounding arrangements and connections for separately derived systems.

b. Instructions for periodic testing and inspection of grounding features at test wells based on NETA MTS NFPA 70B.

1) Tests must determine if ground-resistance or impedance values remain within specified maximums, and instructions must recommend corrective action if values do not.
2) Include recommended testing intervals.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

A. Equipment Grounding Conductor:

1. General Characteristics: 600 V, THHN/THWN-2 THWN-2, copper wire or cable, green color, in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. UL KDER - Armored Grounding Wire:

1. Description: Single corrosion-resistant copper, aluminum, or copper-clad aluminum conductor within helically formed steel armor.

2. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by New York City, and marked for intended location and application.

3. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

C. UL KDSH - Protector Grounding Conductor:

1. Description: Conductors intended to be used for grounding primary protector or metallic members of cable sheath in accordance with Chapters 7 and 8 of NFPA 70.

2. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by New York City, and marked for intended location and application.

3. Listing Criteria:

a. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

4. Options:

a. Color: green.

2.2 GROUNDING AND BONDING CLAMPS

A. Description: Clamps suitable for attachment of grounding and bonding conductors to grounding electrodes, pipes, tubing, and rebar. Grounding and bonding clamps specified in this article are also suitable for use with communications applications.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by New York City, and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
b. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

D. UL KDER and KDSH - Hex-Fitting-Type Pipe and Rod Grounding and Bonding Clamp :

1. General Characteristics:

a. Two pieces with zinc-plated bolts.
b. Clamp Material: Die-cast zinc alloy .
c. Listed for outdoor use.

E. UL KDER and KDSH - U-Bolt-Type Pipe and Rod Grounding and Bonding Clamp :

1. General Characteristics:

a. Clamp Material: Tinned brass.
b. Listed for outdoor use.

F. UL KDER and KDSH - Strap-Type Pipe and Rod Grounding and Bonding Clamp :

1. General Characteristics:

a. Clamp Material: Copper.
b. Listed for outdoor use.

G. UL KDER - Exothermically Welded Connection :

1. General Characteristics: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING AND BONDING BUSHINGS

A. Description: Bonding bushings connect conduit fittings, tubing fittings, threaded metal conduit, and unthreaded metal conduit to metal boxes and equipment enclosures, and have one or more bonding screws intended to provide electrical continuity between bushing and enclosure. Grounding bushings have provision for connection of bonding or grounding conductor and may or may not also have bonding screws.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by NYC BC 2022, and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

D. UL KDER - Bonding Bushing :

1. General Characteristics: Threaded bushing with insulated throat.

E. UL KDER - Grounding Bushing :

1. General Characteristics: Threaded bushing with insulated throat and mechanical-type wire terminal.

2.4 GROUNDING AND BONDING HUBS

A. Description: Hubs with certified grounding or bonding locknut.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

D. UL KDER - Grounding and Bonding Hub :

1. General Characteristics: Insulated, gasketed, watertight hub with mechanical-type wire terminal.

2.5 GROUNDING AND BONDING CONNECTORS

A. Source Limitations: Obtain products from single manufacturer.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
b. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

C. UL KDER - Crimped Pressure-Type Grounding and Bonding Cable Connector :

1. General Characteristics: Crimp-and-compress connectors that bond to conductor when connector is compressed around conductor.

2.6 INTERSYSTEM BONDING BRIDGE GROUNDING CONNECTORS

A. Description: Devices that provide means for connecting communications systems grounding and bonding conductors at service equipment or at disconnecting means for buildings or structures.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

2.7 GROUNDING AND BONDING BUSBARS

A. Description: Miscellaneous grounding and bonding devices that serve as common connection for multiple grounding and bonding conductors.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

D. UL KDER - Equipment Room Grounding and Bonding Busbar :

1. General Characteristics:

a. Bus: Rectangular bar of annealed copper.
b. Mounting Stand-Off Insulators: Lexan or PVC.

1) Comply with UL 891 for use in 600 V switchboards, impulse tested at 5000 V.

2. Options:

a. Dimensions: 1/4 by 4 inch in cross section; length as indicated on Drawings.
b. Predrilled Hole Pattern: 9/32 inch holes spaced 1-1/8 inch apart.
c. Mounting Hardware: Stand-off brackets that provide 4 inch clearance to access rear of bus. Brackets and bolts must be stainless steel.

2.8 GROUNDING (EARTHING) ELECTRODES

A. Source Limitations: Obtain products from single manufacturer.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

C. UL KDER - Rod Electrode :

1. General Characteristics: Copper-clad Zinc-coated steel; 3/4 inch by 10 ft.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine facility's grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of electrical system.

B. Inspect test results of grounding system measured at point of electrical service equipment connection.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with connection of electrical service equipment only after unsatisfactory conditions have been corrected.

3.3 SELECTION OF GROUNDING AND BONDING PRODUCTS

A. Grounding and Bonding Conductors:

1. Provide solid conductor for 8 AWG and smaller, and stranded conductors for 6 AWG and larger unless otherwise indicated.
2. Custom-Length Insulated Equipment Bonding Jumpers: 6 AWG, 19-strand, Type THHN.
3. Bonding Cable: 28 kcmil, 14 strands of 17 AWG conductor, 1/4 inch in diameter.
4. Bonding Conductor: 4 AWG or 6 AWG, stranded conductor.
5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch wide and 1/16 inch thick.
6. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inch wide and 1/16 inch thick.
7. Underground Grounding Conductors: Install bare copper conductor, 2/0 AWG minimum.

B. Grounding and Bonding Connectors:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

C. Grounding and Bonding Busbars: Provide in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated on Drawings.

3.4 SELECTION OF GROUNDING AND BONDING PRODUCTS FOR COMMUNICATIONS

A. Comply with Section 270528 "Pathways for Communications Systems" and Section 271100 "Communications Equipment Room Fittings."

3.5 INSTALLATION OF GROUNDING AND BONDING

A. Comply with manufacturer's published instructions.

B. Special Techniques:

1. Grounding and Bonding Conductors:

a. Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
b. Underground Grounding Conductors:

1) Bury at least 30 inch below grade.
2) Duct-Bank Grounding Conductor: Bury 12 inch above duct bank when indicated as part of duct-bank installation.

2. Grounding and Bonding Connectors: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

a. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
b. Make connections with clean, bare metal at points of contact.
c. Make aluminum-to-steel connections with stainless steel separators and mechanical clamps.
d. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
e. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
f. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1) Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate adjacent parts.
2) Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3) Use exothermic-welded connectors for outdoor locations; if disconnect-type connection is required, use bolted clamp.

g. Grounding and Bonding for Piping:

1) Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use bolted clamp connector or bolt lug-type connector to pipe flange by using one of lug bolts of flange. Where dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2) Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with bolted connector.

h. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.

3. Grounding and Bonding Busbars:

a. Install busbar horizontally, on insulated spacers 2 inch minimum from wall, 6 inch above finished floor unless otherwise indicated.
b. Where busbars are indicated on both sides of doorways, route bonding conductor up to top of door frame, across top of doorway, and down; connect to continuation of horizontal busbar.

4. Electrodes:

a. Ground Rods: Drive rods until tops are 2 inch below finished floor or final grade unless otherwise indicated.

1) Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2) Use exothermic welds for below-grade connections.

b. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least same distance from other grounding electrodes, and connect to service grounding electrode conductor.
c. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes must be at least 12 inch deep, with cover.

1) Install at least one test well for each service unless otherwise indicated. Install at ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

5. Grounding at Service:

a. Equipment grounding conductors and grounding electrode conductors must be connected to ground busbar. Install main bonding jumper between neutral and ground buses.

6. Grounding Underground Distribution System Components:

a. Duct-Bank Grounding Conductor: Bury 12 inch above duct bank when indicated as part of duct-bank installation.

b. Comply with IEEE C2 grounding requirements.

7. Equipment Grounding and Bonding:

a. Install insulated equipment grounding conductors with feeders and branch circuits.
b. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1) Feeders and branch circuits.
2) Lighting circuits.
3) Receptacle circuits.
4) Single-phase motor and appliance branch circuits.
5) Three-phase motor and appliance branch circuits.
6) Flexible raceway runs.
7) Armored and metal-clad cable runs.
8) Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.

c. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
d. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
e. Poles Supporting Outdoor Lighting Fixtures: Bond insulated equipment grounding conductor to equipment grounding terminal inside pole base.
f. Metallic Fences: Comply with requirements of IEEE C2.

1) Grounding Conductor: Bare copper, not less than 8 AWG.
2) Gates: Must be bonded to grounding conductor with flexible bonding jumper.
3) Barbed Wire: Strands must be bonded to grounding conductor.

3.6 FIELD QUALITY CONTROL FOR GROUNDING AND BONDING

A. Field tests and inspections must be witnessed by Commissioner and NYC Department of Buildings Inspector.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with calibrated torque wrench in accordance with manufacturer's published instructions.
3. Test completed grounding system at each location where maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before conductors are connected.

a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
b. Perform tests by fall-of-potential method in accordance with IEEE Std 81.
c. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Commissioner promptly and include recommendations to reduce ground resistance.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to record of tests and observations. Include number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

C. Nonconforming Work:

1. Grounding system will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective components and retest.

D. Collect, assemble, and submit test and inspection reports.

1. Report measured ground resistances that exceed the following values:

a. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 Ω.
b. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 Ω.
c. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 Ω.
d. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 Ω.

3.7 PROTECTION

A. After installation, protect grounding and bonding cables and equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Support, anchorage, and attachment components.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

   a. Slotted support systems, hardware, and accessories.
   b. Clamps.
   c. Hangers.
   d. Sockets.
   e. Eye nuts.
   f. Fasteners.
   g. Anchors.
   h. Saddles.
   i. Brackets.

2. Include rated capacities and furnished specialties and accessories.

B. Shop Drawings: Signed and sealed by a qualified professional engineer licensed in the State of New York. For fabrication and installation details for electrical hangers and support systems.

1. Hangers. Include product data for components.
2. Slotted support systems.
3. Equipment supports.
4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame Rating: Class 1.
2. Self-extinguishing according to ASTM D635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32 inch diameter holes at a maximum of 8 inch on center in at least one surface.

1. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
2. Material for Channel, Fittings, and Accessories: Galvanized steel.
3. Channel Width: Selected for applicable load criteria.
4. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
6. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Aluminum Slotted Support Systems: Extruded-aluminum channels and angles with minimum 13/32 inch diameter holes at a maximum of 8 inch on center in at least one surface.

1. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
2. Channel Material: 6063-T5 aluminum alloy.
3. Fittings and Accessories Material: 5052-H32 aluminum alloy.
4. Channel Width: Selected for applicable load criteria.
5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
6. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs must have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body must be made of malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.
5. Toggle Bolts: Stainless steel springhead type.
6. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 SELECTION

A. Comply with the following standards for selection and installation of hangers and supports, except where requirements on Drawings or in this Section are stricter:

1. NECA NEIS 101
2. NECA NEIS 102.
3. NECA NEIS 105.
4. NECA NEIS 111.

B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

C. Comply with requirements for raceways and boxes specified in Section 260533.13 "Conduits for Electrical Systems."

D. Comply with requirements for boxes specified in Section 260533.16 "Boxes and Covers for Electrical Systems."

E. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and ERMC as scheduled in NECA NEIS 1, where its Table 1 lists maximum spacings that are less than those stated in NFPA 70. Minimum rod size must be 1/4 inch in diameter.

F. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

G. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2 inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.3 INSTALLATION OF SUPPORTS

A. Comply with NECA NEIS 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA NEIS 1, EMT may be supported by openings through structure members, in accordance with NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inch thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inch thick.
5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts .
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inch larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000 psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base as follows:

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup:

1. Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

   a. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

2. Comply with requirements in Section 099123 "Interior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION 260529

SECTION 260533.13 - CONDUITS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Type EMT-A and Type EMT-SS duct raceways and elbows.
2. Type EMT-S duct raceways and elbows.
3. Type ERMC-A and Type ERMC-SS duct raceways, elbows, couplings, and nipples.
4. Type ERMC-S duct raceways, elbows, couplings, and nipples.
5. Type FMC-S and Type FMC-A duct raceways.
6. Type IMC duct raceways.
7. Type LFMC duct raceways.
8. Type RTRC-BG duct raceways and fittings.
9. Fittings for conduit, tubing, and cable.

B. Products Installed, but Not Furnished, under This Section:

1. See Section 260553 "Identification for Electrical Systems" for electrical equipment labels.

C. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260519 "Low-Voltage for Electrical Power Conductors and Cables" for nonmetallic underground conduit with conductors (Type NUCC).

1.3 DEFINITIONS

A. Conduit: A structure containing one or more duct raceways.

B. Duct Raceway: A single enclosed raceway for conductors or cable.

C. Duct Bank: An arrangement of conduit providing one or more continuous duct raceways between two points.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Type EMT-A and Type EMT-SS duct raceways and elbows.
2. Type EMT-S duct raceways and elbows.
3. Type ERMC-A and Type ERMC-SS duct raceways, elbows, couplings, and nipples.
4. Type ERMC-S duct raceways, elbows, couplings, and nipples.
5. Type FMC-S and Type FMC-A duct raceways.
6. Type IMC duct raceways.
7. Type LFMC duct raceways.
8. Type RTRC-BG duct raceways and fittings.
9. Fittings for conduit, tubing, and cable.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 TYPE EMT-A AND TYPE EMT-SS DUCT RACEWAYS AND ELBOWS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN FJMX; including UL 797A.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL FJMX - Aluminum Electrical Metal Tubing (EMT-A) and Elbows:

1. Material: Aluminum.
2. Options:

a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
b. Colors: As indicated on Drawings.

D. UL FJMX - Stainless Steel Electrical Metal Tubing (EMT-SS) and Elbows:

1. Material: Stainless steel.
2. Options:

a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
b. Colors: As indicated on Drawings.

2.2 TYPE EMT-S DUCT RACEWAYS AND ELBOWS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN FJMX; including UL 797.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL FJMX - Steel Electrical Metal Tubing (EMT-S) and Elbows:

1. Material: Steel.
2. Options:

a. Exterior Coating: Zinc.
b. Interior Coating: Zinc.
c. Minimum Trade Size: Metric designator 21 (trade size 3/4).
d. Colors: As indicated on Drawings.

2.3 TYPE ERMC-A AND TYPE ERMC-SS DUCT RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN DYWV; including UL 6A.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL DYWV - Aluminum Electrical Rigid Metal Conduit (ERMC-A), Elbows, Couplings, and Nipples:

1. Material: Aluminum.
2. Options:

    a. Protective Coating: Provide protective coating for use in concrete, and direct burial use.
    b. Minimum Trade Size: Metric designator 21 (trade size 3/4).
    c. Colors: As indicated on Drawings.

2.4 TYPE ERMC-S DUCT RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN DYIX; including UL 6.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL DYIX - Galvanized-Steel Electrical Rigid Metal Conduit (ERMC-S-G), Elbows, Couplings, and Nipples:

1. Exterior Coating: Zinc.
2. Options:

    a. Interior Coating: Zinc.
    b. Minimum Trade Size: Metric designator 21 (trade size 3/4).
    c. Colors: As indicated on Drawings.

D. UL DYIX - PVC-Coated-Steel Electrical Rigid Metal Conduit (ERMC-S-PVC), Elbows, Couplings, and Nipples:

1. Options:

    a. Exterior Coating: PVC complying with NEMA RN 1.
    b. Interior Coating: Zinc.
    c. Minimum Trade Size: Metric designator 21 (trade size 3/4).
    d. Colors: As indicated on Drawings.
    e. Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
    f. Expansion and Deflection Fittings: UL 651 with flexible bonding jumper.

2.5 TYPE FMC-S AND TYPE FMC-A DUCT RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN DXUZ; including UL 1.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL DXUZ - Aluminum Flexible Metal Conduit (FMC-A):

1. Options:

a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
b. Colors: As indicated on Drawings.

2.6 TYPE IMC DUCT RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN DYBY; including UL 1242.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL DYBY - Steel Intermediate Metal Conduit (IMC):

1. Options:

a. Exterior Coating: Zinc .
b. Interior Coating: Zinc.
c. Minimum Trade Size: Metric designator 21 (trade size 3/4).
d. Colors: As indicated on Drawings.

2.7 TYPE LFMC DUCT RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN DXHR; including UL 360.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL DXHR - Steel Liquidtight Flexible Metal Conduit (LFMC-S):

1. Material: Steel.
2. Options:

a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
b. Colors: As indicated on Drawings.

2.8 TYPE RTRC-BG DUCT RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN DZKT; including UL 2420.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL DZXT - Low-Halogen, Belowground Reinforced Thermosetting Resin Conduit (RTRC-BG) and Fittings:

1. Additional Characteristics: Type BG.
2. Options:

a. Minimum Trade Size: Metric designator 21 (trade size 3/4).

2.9 FITTINGS FOR CONDUIT, TUBING, AND CABLE

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.

2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL EBMB - Duct Fittings for Hazardous (Classified) Locations:

1. Listing Criteria: UL CCN EBMB; including UL 1203.

D. UL DWTT - Fittings for Type ERMC, Type IMC, Type PVC, Type HDPE, Type EPEC, and Type RTRC Duct Raceways:

1. Listing Criteria: UL CCN DWTT; including UL 514B.
2. Options:

a. Material: Steel Die cast.
b. Coupling Method: Compression coupling .
c. Expansion and Deflection Fittings: UL 651 with flexible bonding jumper.

E. UL FKAV - Fittings for Type EMT Duct Raceways:

1. Listing Criteria: UL CCN FKAV; including UL 514B.
2. Options:

a. Material: Steel Die cast.
b. Coupling Method: Compression coupling Setscrew coupling. Setscrew couplings with only single screw per conduit are unacceptable.
c. Expansion and Deflection Fittings: UL 651 with flexible bonding jumper.

F. UL ILNR - Fittings for Type FMC Duct Raceways:

1. Listing Criteria: UL CCN ILNR; including UL 514B.

G. UL DXAS - Fittings for Type LFMC and Type LFNC Duct Raceways:

1. Listing Criteria: UL CCN DXAS; including UL 514B.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 SELECTION OF CONDUITS FOR ELECTRICAL SYSTEMS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NFPA 70 for selection of duct raceways. Consult Commissioner for resolution of conflicting requirements.

B. Outdoors:

1. Exposed and Subject to Severe Physical Damage: ERMC .
2. Exposed and Subject to Physical Damage: ERMC.

    a. Locations less than 2.5 m (8 ft) above finished floor.

3. Exposed and Not Subject to Physical Damage: IMC.
4. Concealed Aboveground: EMT.
5. Direct Buried: RTRC-BG.
6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

C. Indoors:

1. Exposed and Subject to Severe Physical Damage: ERMC . Locations include the following:

    a. Loading docks.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical rooms.
    d. Gymnasiums.

2. Exposed and Subject to Physical Damage: ERMC. Locations include the following:

    a. Locations less than 2.5 m (8 ft) above finished floor.
    b. Stub-ups to above suspended ceilings.

3. Exposed and Not Subject to Physical Damage: EMT.
4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Damp or Wet Locations: ERMC.
6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

D. Duct Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.

1. ERMC and IMC: Provide threaded-type fittings unless otherwise indicated.

3.3 INSTALLATION OF CONDUITS FOR ELECTRICAL SYSTEMS

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Type EMT-A: Article 358 of NFPA 70 and NECA NEIS 102.
2. Type EMT-SS: Article 358 of NFPA 70 and NECA NEIS 101.
3. Type EMT-S: Article 358 of NFPA 70 and NECA NEIS 101.
4. Type ERMC-A: Article 344 of NFPA 70 and NECA NEIS 102.
5. Type ERMC-S: Article 344 of NFPA 70 and NECA NEIS 101.
6. Type FMC-A: Article 348 of NFPA 70 and NECA NEIS 102.
7. Type IMC: Article 342 of NFPA 70 and NECA NEIS 101.
8. Type LFMC: Article 350 of NFPA 70 and NECA NEIS 101.

9. Expansion Fittings: NEMA FB 2.40.

C. Special Installation Techniques:

1. General Requirements for Installation of Duct Raceways:

a. Complete duct raceway installation before starting conductor installation.
b. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 ft above finished floor.
c. Install no more than equivalent of three 90-degree bends in conduit run except for control wiring conduits, for which no more than equivalent of two 90-degree fewer bends are permitted. Support within 12 inch of changes in direction.
d. Make bends in duct raceway using large-radius preformed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
e. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
f. Support conduit within 12 inch of enclosures to which attached.
g. Install duct sealing fittings at accessible locations in accordance with NFPA 70 and fill them with listed sealing compound. For concealed duct raceways, install fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install duct sealing fittings in accordance with NFPA 70.
h. Install devices to seal duct raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal interior of duct raceways at the following points:

1) Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2) Where an underground service duct raceway enters a building or structure.
3) Conduit extending from interior to exterior of building.
4) Conduit extending into pressurized duct raceway and equipment.
5) Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
6) Where otherwise required by NFPA 70.

i. Do not install duct raceways or electrical items on "explosion-relief" walls or rotating equipment.
j. Do not install conduits within 2 inch of the bottom side of a metal deck roof.
k. Keep duct raceways at least 6 inch away from parallel runs of flues and steam or hot-water pipes. Install horizontal duct raceway runs above water and steam piping.
l. Cut conduit perpendicular to the length. For conduits metric designator 53 (trade size 2) and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs.
m. Install pull wires in empty duct raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 12 inch of slack at both ends of pull wire. Cap underground duct raceways designated as spare above grade alongside duct raceways in use.
n. Install duct raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one-quarter turn more.

1) Termination fittings with shoulders do not require two locknuts.

o. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to metric designator 35 (trade size 1-1/4) and insulated throat metal bushings on metric designator 41 (trade size 1-1/2) and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

2. Types EMT-A, ERMC-A, and FMC-A: Do not install aluminum duct raceways or fittings in contact with concrete or earth.
3. Types ERMC and IMC:

a. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound that maintains electrical conductivity to threads of duct raceway and fittings before making up joints. Follow compound manufacturer's published instructions.

4. Type ERMC-S-PVC:

a. Follow manufacturer's installation instructions for clamping, cutting, threading, bending, and assembly.
b. Provide PVC-coated sealing locknut for exposed male threads transitioning into female NPT threads that do not have sealing sleeves, including transitions from PVC couplings/female adapters to Type ERMC-S-PVC elbows in direct-burial applications. PVC-coated sealing locknuts must not be used in place of conduit hub. PVC-coated sealing locknut must cover exposed threads on Type ERMC-S-PVC duct raceway.
c. Coat field-cut threads on PVC-coated duct raceway with manufacturer-approved corrosion-preventing conductive compound prior to assembly.

5. Types FMC, LFMC, and LFNC:

a. Provide a maximum of 36 inch of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

6. Type RTRC: Do not install Type RTRC conduit where ambient temperature exceeds 230 deg F.
7. Duct Raceways Embedded in Slabs:

a. Run duct raceways larger than metric designator 27 (trade size 1) below concrete slab Run duct raceways larger than metric designator 27 (trade size 1) parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place duct raceway close to slab support. Secure duct raceways to reinforcement at maximum 10 ft intervals.
b. Arrange duct raceways to cross building expansion joints with expansion fittings at right angles to the joint.
c. Arrange duct raceways to ensure that each is surrounded by minimum of 2 inch of concrete without voids.
d. Do not embed threadless fittings in concrete unless locations have been specifically approved by Commissioner.

8. Stub-ups to Above Recessed Ceilings:

a. Provide EMT, IMC, or ERMC for duct raceways.

b. Provide a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

9. Duct Raceway Terminations at Locations Subject to Moisture or Vibration:

a. Provide insulating bushings to protect conductors, including conductors smaller than 4 AWG. Install insulated throat metal grounding bushings on service conduits.

10. Duct Fittings: Install fittings in accordance with NEMA FB 2.10 guidelines.

a. ERMC-S-PVC: Provide only fittings listed for use with this type of conduit. Patch and seal joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Provide sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
b. Flexible Conduit: Provide only fittings listed for use with flexible conduit type. Comply with NEMA FB 2.20.

11. Expansion-Joint Fittings:

a. Install in runs of aboveground PVC that are located where environmental temperature change may exceed 30 deg F and that have straight-run length that exceeds 25 ft. Install in runs of aboveground ERMC and EMT conduit that are located where environmental temperature change may exceed 100 deg F and that have straight-run length that exceeds 100 ft.
b. Install type and quantity of fittings that accommodate temperature change listed for the following locations:

1) Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
2) Attics: 135 deg F temperature change.

c. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
d. Install expansion fittings at locations where conduits cross building or structure expansion joints.
e. Install expansion-joint fitting with position, mounting, and piston setting selected in accordance with manufacturer's published instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

12. Duct Raceways Penetrating Rooms or Walls with Acoustical Requirements: Seal duct raceway openings on both sides of rooms or walls with acoustically rated putty or firestopping.
13. Identification: Provide labels for conduit assemblies, duct raceways, and associated electrical equipment.

a. Provide warning signs.

D. Interfaces with Other Work:

1. Coordinate with Section 078413 "Penetration Firestopping" for installation of firestopping at penetrations of fire-rated floor and wall assemblies.

2. Coordinate with Section 260529 "Hangers and Supports for Electrical Systems" for installation of conduit hangers and supports.

3.4 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533.13

SECTION 260533.16 - BOXES AND COVERS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Metallic outlet boxes, device boxes, rings, and covers.
2. Junction boxes and pull boxes.
3. Cover plates for device boxes.
4. Hoods for outlet boxes.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" specifies additional coordination, scheduling, sequencing, submittal, and installation requirements applicable to the Work for electrical, communications, and electronic safety and security systems on the Project, including wiring methods.
2. Section 260526 "Grounding and Bonding for Electrical Systems" specifies grounding and bonding referenced by this Section.
3. Section 260553 "Identification for Electrical Systems" specifies electrical equipment labels and warning signs installed by this Section.

1.3 DEFINITIONS

A. Communications Outlet: One or more communications jacks, or cables and plugs, mounted in a box or ring, with a suitable protective cover.

B. Enclosure: The case or housing of an apparatus, or the fence or wall(s) surrounding an installation, to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. Types of enclosures and enclosure covers include the following:

1. Cabinet: An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.
2. Concrete Box: A box intended for use in poured concrete.
3. Conduit Body: A means for providing access to the interior of a conduit or tubing system through one or more removable covers at a junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
4. Conduit Box: A box having threaded openings or knockouts for conduit, EMT, or fittings.
5. Cover Plate: A cover designed for protecting wiring devices installed in flush-mounted device boxes while permitting their safe operation; also called a faceplate or wallplate.

6. Cutout Box: An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure.
7. Device Box: A box with provisions for mounting a wiring device directly to the box.
8. Extension Ring: A ring intended to extend the sides of an outlet box or device box to increase the box depth, volume, or both.
9. Floor Box: A box mounted in the floor intended for use with a floor box cover and other components to complete the floor box enclosure.
10. Floor-Mounted Enclosure: A floor box and floor box cover assembly with means to mount in the floor that is sealed against the entrance of scrub water at the floor level.
11. Floor Nozzle: An enclosure used on a wiring system, intended primarily as a housing for a receptacle, provided with a means, such as a collar, for surface-mounting on a floor, which may or may not include a stem to support it above the floor level, and is sealed against the entrance of scrub water at the floor level.
12. Junction Box: A box with a blank cover that joins different runs of raceway or cable and provides space for connection and branching of the enclosed conductors.
13. Outlet Box: A box that provides access to a wiring system having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for the entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting an outlet box cover, but without provisions for mounting a wiring device directly to the box.
14. Pedestal Floor Box Cover: A floor box cover that, when installed as intended, provides a means for typically vertical or near-vertical mounting of receptacle outlets above the floor's finished surface.
15. Pull Box: A box with a blank cover that joins different runs of raceway and provides access for pulling or replacing the enclosed cables or conductors.
16. Raised-Floor Box: A floor box intended for use in raised floors.
17. Recessed Access Floor Box: A floor box with provisions for mounting wiring devices below the floor surface.
18. Recessed Access Floor Box Cover: A floor box cover with provisions for passage of cords to recessed wiring devices mounted within a recessed floor box.
19. Ring: A sleeve, which is not necessarily round, used for positioning a recessed wiring device flush with the plaster, concrete, drywall, or other wall surface.
20. Ring Cover: A box cover, with raised center portion to accommodate a specific wall or ceiling thickness, for mounting wiring devices or luminaires flush with the surface.
21. Termination Box: An enclosure designed for installation of termination base assemblies consisting of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors, or both.

C. Receptacle: A fixed connecting device arranged for insertion of a power cord plug. Also called a power jack.

D. Receptacle Outlet: One or more receptacles mounted in a box with a suitable protective cover.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Products or components listed and labeled in accordance with NFPA 70 by qualified electrical testing laboratory, and marked for intended location and application.

2.2 METALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

A. UL QCIT - Metallic Outlet Boxes and Covers:

1. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:

a. UL CCN QCIT; including UL 514A.

2. Standard Features:

a. Box having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.
b. Material: Sheet steel Cast metal.

3. Sustainable Design Features:

a. Corporate Sustainability Report: Provide third-party-verified corporate sustainability report that is publicly available from manufacturer and that includes environmental impacts of extraction operations and activities associated with product and its supply chain.

B. UL QCIT - Metallic Device Boxes:

1. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:

a. UL CCN QCIT; including UL 514A.

2. Standard Features:

a. Box with provisions for mounting wiring device directly to box.
b. Material: Sheet steel.

3. Sustainable Design Features:

a. Corporate Sustainability Report: Provide third-party-verified corporate sustainability report that is publicly available from manufacturer and that includes environmental impacts of extraction operations and activities associated with product and its supply chain.

2.3 JUNCTION BOXES AND PULL BOXES

A. UL BGUZ - Indoor Sheet Metal Junction and Pull Boxes:

1. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:

a. UL CCN BGUZ; including UL 50 and UL 50E.

2. Standard Features:

a. Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
b. Degree of Protection: Type 1.

3. Sustainable Design Features:

a. Corporate Sustainability Report: Provide third-party-verified corporate sustainability report that is publicly available from manufacturer and that includes environmental impacts of extraction operations and activities associated with product and its supply chain.

B. UL BGUZ - Indoor Cast-Metal Junction and Pull Boxes:

1. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:

a. UL CCN BGUZ; including UL 50 and UL 50E.

2. Standard Features:

a. Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
b. Degree of Protection: Type 1.

3. Sustainable Design Features:

a. Corporate Sustainability Report: Provide third-party-verified corporate sustainability report that is publicly available from manufacturer and that includes environmental impacts of extraction operations and activities associated with product and its supply chain.

C. UL BGUZ - Outdoor Sheet Metal Junction and Pull Boxes:

1. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:

a. UL CCN BGUZ; including UL 50 and UL 50E.

2. Standard Features:

a. Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
b. Degree of Protection: Type 3R.

3. Sustainable Design Features:

a. Corporate Sustainability Report: Provide third-party-verified corporate sustainability report that is publicly available from manufacturer and that includes environmental impacts of extraction operations and activities associated with product and its supply chain.

D. UL BGUZ - Outdoor Cast-Metal Junction and Pull Boxes:

1. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:

a. UL CCN BGUZ; including UL 50 and UL 50E.

2. Standard Features:

a. Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
b. Degree of Protection: Type 3R.

3. Sustainable Design Features:

a. Corporate Sustainability Report: Provide third-party-verified corporate sustainability report that is publicly available from manufacturer and that includes environmental impacts of extraction operations and activities associated with product and its supply chain.

2.4 COVER PLATES FOR DEVICE BOXES

A. UL QCIT or QCMZ - Metallic Cover Plates for Device Boxes:

1. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:

a. UL CCN QCIT or UL CCN QCMZ; including UL 514D.

2. Standard Features:

a. Cover plate-Securing Screws: Metal with head color to match cover plate finish.
b. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
c. Cover Plate Material: Galvanized steel.

3. Sustainable Design Features:

a. Corporate Sustainability Report: Provide third-party-verified corporate sustainability report that is publicly available from manufacturer and that includes environmental impacts of extraction operations and activities associated with product and its supply chain.

2.5 HOODS FOR OUTLET BOXES

A. UL QCIT or QCMZ - Extra-Duty, While-in-Use Hoods for Outlet Boxes:

1. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:

a. UL CCN QCIT or UL CCN QCMZ; including UL 514D.
b. Receptacle, Hood, Cover Plate, Gaskets, and Seals: UL 498 Supplement SA when mated with box or enclosure complying with UL 514A, UL 514C, or UL 50E.

2. Standard Features:

a. Mounts to box using fasteners different from wiring device.
b. Marked "Extra-Duty" in accordance with UL 514D.
c. Provides clear, weatherproof, "while-in-use" cover.
d. Manufacturer may combine nonmetallic device box with hood as extra-duty rated assembly.

3. Sustainable Design Features:

a. Corporate Sustainability Report: Provide third-party-verified corporate sustainability report that is publicly available from manufacturer and that includes environmental impacts of extraction operations and activities associated with product and its supply chain.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 SELECTION OF BOXES AND COVERS FOR ELECTRICAL SYSTEMS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NFPA 70 for selection of boxes and enclosures. Consult Commissioner for resolution of conflicting requirements.

B. Degree of Protection:

1. Outdoors:

a. Type 3R unless otherwise indicated.
b. Locations Exposed to Hosedown: Type 4X.
c. Locations Subject to Potential Flooding: Type 6P.
d. Locations Aboveground Where Mechanism Must Operate When Ice Covered: Type 3S.
e. Locations in-Ground or Exposed to Corrosive Agents: Type 4X.
f. Locations in-Ground or Exposed to Corrosive Agents Where Mechanism Must Operate When Ice Covered: Type 3SX.

2. Indoors:

   a. Type 1 unless otherwise indicated.
   b. Damp or Dusty Locations: Type 2.
   c. Surface Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12.
   d. Flush Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12.
   e. Locations Exposed to Airborne Dust, Lint, Fibers, or Flyings: Type 4.
   f. Locations Exposed to Hosedown: Type 4.
   g. Locations Exposed to Brief Submersion: Type 6.
   h. Locations Exposed to Prolonged Submersion: Type 6P.
   i. Locations Exposed to Corrosive Agents: Type 4X.
   j. Locations Exposed to Spraying Oil or Coolants: Type 13.

C. Exposed Boxes Installed Less Than 2.5 m (8 ft) Above Floor:

1. Boxes with knockouts or unprotected openings are prohibited.
2. Provide exposed cover. Flat covers with angled mounting slots or knockouts are prohibited.

3.3 INSTALLATION OF BOXES AND COVERS FOR ELECTRICAL SYSTEMS

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Electrical Construction: NYC Building Code, NYC Electrical Code, NYC Fire Code, NFPA 1, NFPA 70, and NECA NEIS 1.
2. Electrical Safety: NFPA 70E.
3. Commissioning of Active and Passive Fire Protection Features: NFPA 3 and NFPA 4.
4. Grounding and Bonding: NECA NEIS 331 and Article 250 of NFPA 70.
5. Communications Work: BICSI N1.
6. Life Safety and Means of Egress Work: NFPA 101.
7. Emergency and Standby Power Work: NFPA 110, NFPA 111, and NECA NEIS 416.
8. Work in Confined Spaces: NFPA 350.
9. Work in Basements and Other Developed Subterranean Spaces: NFPA 520.
10. Outlet, Device, Pull, and Junction Boxes: Article 314 of NFPA 70.
11. Consult Commissioner for resolution of conflicting requirements.

C. Special Installation Techniques:

1. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.
2. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to top of box unless otherwise indicated.
3. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box, whether installed indoors or outdoors.

4. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
5. Locate boxes so that cover or plate will not span different building finishes.
6. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.
7. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.
8. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.
9. Set metal floor boxes level and flush with finished floor surface.
10. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
11. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.
12. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.
13. Boxes and Enclosures in Areas or Walls with Acoustical Requirements:

    a. Seal openings and knockouts in back and sides of boxes and enclosures with acoustically rated putty.
    b. Provide gaskets for cover plates and covers.

D. Interfaces with Other Work:

1. Identification: Provide labels for boxes and associated electrical equipment.

    a. Identify field-installed conductors, interconnecting wiring, and components.
    b. Label each enclosure with engraved metal or laminated-plastic nameplate.
    c. Provide warning signs and arc-flash hazard warning labels for electrical equipment.

3.4 CLEANING

A. Remove construction dust and debris from boxes before installing cover plates, covers, and hoods.

3.5 PROTECTION

A. After installation, protect boxes from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

END OF SECTION 260533.16

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Labels.
2. Extruded insulating tubing.
3. Bands.
4. Tapes and stencils.
5. Tags.
6. Signs.
7. Cable ties.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" specifies additional requirements applicable to coordinating, scheduling, and sequencing of the Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions, Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 LABELS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN PGDQ2 for components; including UL 969.

B. UL PGDQ2 - Vinyl Wraparound Labels: Preprinted, flexible labels laminated with clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

C. UL PGDQ2 - Self-Adhesive Wraparound Labels: Preprinted , 3 mil thick, vinyl flexible label with acrylic pressure-sensitive adhesive.

1. Self-Lamination: Clear; UV-, weather-, and chemical-resistant; self-laminating, with protective shield over legend. Size labels such that clear shield overlaps entire printed legend.
2. Marker for Labels:

a. Permanent, waterproof, black ink marker recommended by tag manufacturer.

D. UL PGDQ2 - Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3 mil thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Minimum Nominal Size:

a. 1-1/2 by 6 inch for raceway and conductors.
b. 3-1/2 by 5 inch for equipment.

2.2 EXTRUDED INSULATING TUBING

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN YDPU2 for components; including UL 224.

B. UL YDPU2 - Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at maximum of 200 deg F.

2.3 BANDS

A. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.

B. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inch long, with diameters sized to suit diameters and that stay in place by gripping action.

2.4 TAPES AND STENCILS

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mil thick by 1 to 2 inch wide; compounded for outdoor use.

C. Tape and Stencil: 4 inch wide black stripes on 10 inch centers placed diagonally over orange background and are 12 inch wide. Stop stripes at legends.

D. Floor Marking Tape: 2 inch wide, 5 mil pressure-sensitive vinyl tape, with black and white yellow and black stripes and clear vinyl overlay.

E. Underground-Line Warning Tape:

1. Tape:

   a. Recommended by manufacturer for method of installation and suitable to identify and locate underground electrical utility lines.
   b. Printing on tape must be permanent and may not be damaged by burial operations.
   c. Tape material and ink must be chemically inert and not be subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

2. Color and Printing:

   a. Comply with APWA Uniform Color Code using NEMA Z535.1 safety colors.
   b. Inscriptions for Red Tapes: "CAUTION BURIED ELECTRIC LINE BELOW".

3. Nonconducting Line-Warning Tape :

   a. Pigmented polyolefin, bright colored, continuous-printed on one side with inscription of utility, compounded for direct-burial service.
   b. Width: 3 inch.
   c. Thickness: 4 mil.
   d. Weight: 18.5 lb/1000 sq. ft.
   e. Tensile in accordance with ASTM D882: 30 lbf and 2500 psi.

4. Reinforced Nonconducting Line-Warning Tape :

   a. Multilayer laminate, consisting of high-density polyethylene scrim coated with pigmented polyolefin; bright colored, continuous-printed on one side with inscription of utility, compounded for direct-burial service.
   b. Width: 3 inch.
   c. Thickness: 12 mil.
   d. Weight: 36.1 lb/1000 sq. ft.
   e. Tensile in accordance with ASTM D882: 400 lbf and 11,500 psi.

5. Detectable Line-Warning Tape :

   a. Detectable three-layer laminate, consisting of printed pigmented polyolefin film, solid aluminum-foil core, and clear protective film that allows inspection of continuity of conductive core; bright colored, continuous-printed on one side with inscription of utility, compounded for direct-burial service.
   b. Width: 3 inch.

c. Overall Thickness: 5 mil.
d. Foil Core Thickness: 0.35 mil.
e. Weight: 28 lb/1000 sq. ft.
f. Tensile in accordance with ASTM D882: 70 lbf and 4600 psi.

6. Reinforced Detectable Line-Warning Tape :

a. Reinforced, detectable three-layer laminate, consisting of printed pigmented woven scrim, solid aluminum-foil core, and clear protective film that allows inspection of continuity of conductive core; bright-colored, continuous-printed on one side with inscription of utility, compounded for direct-burial service.
b. Width: 3 inch.
c. Overall Thickness: 8 mil.
d. Foil Core Thickness: 0.35 mil.
e. Weight: 34 lb/1000 sq. ft.
f. Tensile in accordance with ASTM D882: 300 lbf and 12,500 psi.

F. Concrete Cable Route Markers :

1. Description: Concrete markers visually aid tracing the route of electrical cables. Monument markers are typically installed at grade. Protective cover markers are typically installed above the cables at grade or below grade.
2. Product Characteristics:

a. Material: Precast reinforced concrete.
b. Marker Type:

1) Above-Ground Monument Post:

a) Nominal Dimensions (Height, Width, Depth): 30 inch, 6 inch, 3 inch.

c. Legend: "DANGER - ELECTRICITY,""ELECTRIC CABLES," and "ELECTRIC SPLICE."
d. Lettering: Approximately 1/8 inch deep, not less than 1 inch 1.5 inch high, symmetrically spaced; marked on both sides to allow for reversal.

3. Required Product Options:

a. Color: Red dye added to concrete during batching.
b. Attach metal medallion or sign stamped with feeder number.

G. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height must be 1 inch .

2.5 TAGS

A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.023 inch thick, color-coded for phase and voltage level, with factory printed permanent designations; punched for use with self-locking cable tie fastener.

2.6 SIGNS

A. Baked-Enamel Signs:

1. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4 inch grommets in corners for mounting.
3. Nominal Size: 7 by 10 inch.

B. Metal-Backed Butyrate Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396 inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
2. 1/4 inch grommets in corners for mounting.
3. Nominal Size: 10 by 14 inch.

C. Laminated Acrylic or Melamine Plastic Signs:

1. Engraved legend.
2. Thickness:

a. For signs up to 20 sq. inch, minimum 1/16 inch thick.
b. For signs larger than 20 sq. inch, 1/8 inch thick.
c. Engraved legend with black letters on white face .
d. Punched or drilled for mechanical fasteners with 1/4 inch grommets in corners for mounting .
e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.7 CABLE TIES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN ZODZ; including UL 1565 or UL 62275.

B. UL ZODZ - General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F in accordance with ASTM D638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

C. UL ZODZ - UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F in accordance with ASTM D638: 12,000 psi.

3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black.

D. UL ZODZ - Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F in accordance with ASTM D638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.3 SELECTION OF COLORS AND IDENTIFICATION MARKINGS

A. Comply with 29 CFR 1910.144 for color identification of hazards, and the following:

1. Fire-protection and fire-alarm equipment, including raceways, must be finished, painted, or suitably marked safety red.
2. Ceiling-mounted hangers, supports, cable trays, and raceways must be finished, painted, or suitably marked safety yellow where less than 7.7 ft above finished floor.

B. Pipe and Conduit Labeling: Comply with ASME A13.1 and IEEE C2.

C. Color-Coding for Phase- and Voltage-Level Identification, 1000 V or Less: Use colors listed below for ungrounded service conductors.

1. Color must be factory applied or field applied for sizes larger than 6 AWG.
2. Colors for 208Y/120 V Circuits:

a. Phase A: Black.
b. Phase B: Red.
c. Phase C: Blue.

3. Color for Neutral (Grounded Conductor): White.
4. Color for Equipment Ground: Green.

D. Color-Coding Raceways, Cable Trays, Junction Boxes, and Conductors for Intrinsically-Safe Circuits: Light blue. When used to identify intrinsically-safe circuits, Article 504 of NFPA 70 requires that the color light blue not be used for any other purpose.

E. Color-Coding Instructional Signs: Self-adhesive labels, including color code for grounded and ungrounded conductors.

F. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

G. Locations of Underground Lines: Underground-line warning tape for power and lighting.

H. Vaults, Manholes, Handholes, and Pull and Junction Boxes, 1000 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive wraparound labels to identify phase.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.
2. Identify system voltage with black letters on orange field.

I. Accessible Raceways and Metal-Clad Cables, 1000 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.
2. Identify system voltage with black letters on orange field.

J. Conductors to Be Extended in Future: Attach marker tape to conductors and list source.

K. Cover Plates: Label individual cover plates with self-adhesive labels. Place label at top of cover plate. Label cover plate with the following information, in the order listed:

1. Panelboard designation.
2. Colon or dash.
3. Branch circuit number.

L. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in direction of access to live parts. Workspace must comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

M. Equipment Identification Labels:

1. Black letters on white field.
2. Indoor Equipment: Baked-enamel signs .
3. Outdoor Equipment: Laminated acrylic or melamine sign.
4. Equipment to Be Labeled:

a. Panelboards: Typewritten directory of circuits in location provided by panelboard manufacturer. Panelboard identification must be in form of self-adhesive, engraved, laminated acrylic or melamine label.
b. Enclosures and electrical cabinets.

c. Access doors and panels for concealed electrical items.
d. Switchgear.
e. Switchboards.
f. Transformers: Label that includes tag designation indicated on Drawings for transformer, feeder, and panelboards or equipment supplied by secondary.
g. Enclosed switches.
h. Enclosed circuit breakers.
i. Enclosed controllers.
j. Variable-speed controllers.
k. Contactors.
l. Remote-controlled switches, dimmer modules, and control devices.
m. Uninterruptible power supplies.
n. Monitoring and control equipment.

N. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.4 SELECTION OF SIGNS AND HAZARD MARKINGS

A. Comply with 29 CFR 1910.145 for danger, caution, warning, and safety instruction signs.

B. Signs, labels, and tags required for personnel safety must comply with the following standards:

1. Safety Colors: NEMA Z535.1.
2. Facility Safety Signs: NEMA Z535.2.
3. Safety Symbols: NEMA Z535.3.
4. Product Safety Signs and Labels: NEMA Z535.4.
5. Safety Tags and Barricade Tapes for Temporary Hazards: NEMA Z535.5.

C. Electrical Hazard Warnings:

1. Arc-Flash Hazard Warning: Self-adhesive labels. Comply with NFPA 70E requirements for arc-flash hazard warning labels.
2. Multiple Power Sources Warning Legend: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
3. OSHA Workspace Clearance Warning Legend: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 3 FEET MINIMUM."

D. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels Baked-enamel warning signs Metal-backed, butyrate warning signs.

1. Apply to exterior of door, cover, or other access.
2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

a. Power-transfer switches.
b. Controls with external control power connections.

E. Operating Instruction Signs: Baked-enamel warning signs.

3.5 SELECTION OF IDENTIFICATION PRODUCTS FOR COMMUNICATIONS, CONTROL, AUXILIARY, AND LIFE SAFETY SYSTEMS

A. Comply with Section 270528 "Pathways for Communications Systems" and Section 271100 "Communications Equipment Room Fittings."

3.6 INSTALLATION

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes typical for electrical equipment environments.

C. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

D. Fasteners for Labels and Signs: Self-tapping, stainless steel screws or stainless steel machine screws with nuts and flat and lock washers.

E. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

F. Install identifying devices before installing acoustical ceilings and similar concealment.

G. Verify identity of item before installing identification products.

H. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

I. Apply identification devices to surfaces that require finish after completing finish work.

J. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

K. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from floor.

L. Vinyl Wraparound Labels:

1. Secure tight to surface of raceway or cable at location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to location and substrate.

M. Snap-Around Labels: Secure tight to surface at location with high visibility and accessibility.

N. Self-Adhesive Wraparound Labels: Secure tight to surface at location with high visibility and accessibility.

O. Snap-Around Color-Coding Bands: Secure tight to surface at location with high visibility and accessibility.

P. Heat-Shrink, Preprinted Tubes: Secure tight to surface at location with high visibility and accessibility.

Q. Marker Tapes: Secure tight to surface at location with high visibility and accessibility.

R. Self-Adhesive Vinyl Tape: Secure tight to surface at location with high visibility and accessibility.

1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for minimum distance of 6 inch where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

S. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

T. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's instructions.

U. Underground Line Warning Tape:

1. During backfilling of trenches, install continuous underground-line warning tape not less than 12 inch directly above cables or raceways buried 18 inch or more below grade. Use multiple tapes where width of multiple lines installed in common trench or concrete envelope exceeds 16 inch overall.
2. Limit use of underground-line warning tape to direct-buried cables.
3. Install underground-line warning tape for direct-buried cables and cables in raceways.

V. Concrete Cable Route Markers: As indicated on Drawings.

W. Metal Tags:

1. Place in location with high visibility and accessibility.
2. Secure using plenum-rated cable ties.

X. Nonmetallic Preprinted Tags:

1. Place in location with high visibility and accessibility.
2. Secure using plenum-rated cable ties.

Y. Baked-Enamel Signs: Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.

Z. Metal-Backed Butyrate Signs: Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.

AA. Laminated Acrylic or Melamine Plastic Signs: Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.

END OF SECTION 260553

SECTION 260800 - COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes:

1. Cx process requirements for the following Normal and Emergency electrical systems, assemblies, and equipment:

   a. Motor-control centers.
   b. Transformers.
   c. Primary and secondary service electrical systems.
   d. Distribution and branch-circuit panelboards.
   e. Grounding systems.

2. Controls and instrumentation, including the following:

   a. Equipment monitoring systems.
   b. Energy monitoring and control systems.
   c. Electrical metering and metering system.
   d. Lighting control systems.
   e. Security systems.
   f. Fire-alarm systems.

3. Systems testing and verification, including Normal electrical systems.

B. Related Requirements:

1. DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for general Cx process and testing requirements and CxA responsibilities.
2. For Construction Checklists, comply with requirements in various Division 26 Sections specifying electrical systems, system components, equipment, and products.

1.3 DEFINITIONS

A. BAS: Building automation system.

B. Cx: Commissioning, as defined in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems."

C. CxA: Commissioning Agent (Aka Commissioning Authority), as defined in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems."

1. The CxA directs and coordinates the commissioning activities and reports to the Commissioner. All members in the construction process work together to fulfill their contracted responsibilities and meet the objectives of the Owner's Project Requirement's as detailed in the Contract Documents.

D. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they mean "as-built" systems, assemblies, subsystems, equipment, and components.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 INFORMATIONAL SUBMITTALS

A. Construction Checklists:

1. Draft Cx plan, including draft Construction Checklists to be prepared by CxA under DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems." Div. 26 Subcontractor is to review Construction Checklist in accordance with requirements in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" and ASHRAE 202 and to resolve any issues with the CxA.

B. Test Equipment and Instruments: For all test equipment and instruments to be used in conducting Cx tests, provide the following:

1. Equipment/instrument identification number.
2. Planned Cx application or use.
3. Manufacturer, make, model, and serial number.
4. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.
5. Equipment manufacturers' instrumentation and tools. For each instrument or tool, identify the following:

   a. Instrument or tool identification number.
   b. Equipment schedule designation of equipment for which the instrument or tool is required.
   c. Manufacturer, make, model, and serial number.
   d. Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.

1.6 CLOSEOUT SUBMITTALS

A. Provide operation and maintenance manuals complying with requirements of DDC General Conditions Section 017839 "Contract Record Documents" and Section 019113 "General Commissioning Requirements for MEP Systems."

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Testing Equipment and Instrumentation Quality and Calibration:

1. For test equipment and instrumentation required to perform electrical Cx work, perform the following:

a. Submit test equipment and instrumentation list. For each equipment or instrument, identify the following:

1) Equipment/instrument identification number.
2) Planned Cx application or use.
3) Manufacturer, make, model, and serial number.
4) Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.

b. Test equipment and instrumentation must meet the following criteria:

1) Capable of testing and measuring performance within the specified acceptance criteria.
2) Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
3) Be maintained in good repair and operating condition throughout duration of use on Project.
4) Be recalibrated/repaired if dropped or damaged in any way since last calibrated at no additional cost to City of New York.

C. Test Instrumentation and Tools:

1. Equipment Manufacturer's Instrumentation and Tools: For installed equipment included in the Cx process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, perform the following:

a. Submit instrumentation and tools list. For each instrument or tool, identify the following:

1) Instrument or tool identification number.
2) Equipment schedule designation of equipment for which the instrument or tool is required.
3) Manufacturer, make, model, and serial number.
4) Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.

b. Include a separate list of test instrumentation and tools in operation and maintenance manuals.

2. Electrical test instrumentation and tools become property of City of New York at the time of Substantial Completion.

1.8 COORDINATION

A. Refer to "Coordination" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for coordination requirements including the following:

1. Commissioning Kick-Off and other required meetings.
2. Construction Documents distribution to CxA.
3. Testing Coordination.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 Cx PROCESS:

A. Perform Cx process in accordance with DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for BAS and electrical systems in accordance with the following:

1. New York City Energy Conservation Code.
2. ASHRAE 202.

3.3 CONTRACTOR’S RESPONSIBILITIES

A. In addition to the Contractor's responsibilities indicated in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" the Contractor is responsible for the following:

1. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance test requirements specified in Division 26 Sections specifying electrical systems and equipment.
2. Attend construction phase controls coordination meetings and ensure that the electrical and controls Subcontractors attend.
3. Prepare preliminary schedule for electrical system orientations and inspections, operation and maintenance manual submissions, orientation sessions, megger, NETA, and continuity tests and task completion for the City of New York.
4. Distribute preliminary schedule to commissioning team members at the beginning of the construction phase.

B. The Contractor to provide written notification to the Commissioner and CxA that the following work has been completed in accordance with the Contract Documents, and that the equipment, systems, and sub-systems are operating as designed.

1. Electrical equipment including switchgear, panelboards, transformers and all other equipment furnished in Division 26 specification sections.
2. Fire stopping in the fire rated construction, including fire and smoke damper installation, furnished in Division 07 specification sections.
3. Fire detection and smoke detection devices furnished in Division 28 specification sections.

3.4 CONSTRUCTION CHECKLISTS

A. Preliminary detailed Construction Checklists are to be prepared under Section 019113 "General Commissioning Requirements for MEP Systems" for each BAS and electrical system, assembly, subsystem, equipment, and component required to be commissioned, as detailed in ASHRAE 202. Contractor performs the following:

1. Review BAS and electrical preliminary Construction Checklists and provide written comments on checklist items where appropriate.
2. Return preliminary Construction Checklist with review comments within 10 days of receipt.
3. When review comments have been resolved, the CxA will provide final Construction Checklists marked "Approved for Use, (date)."
4. Use only Construction Checklists marked "Approved for Use, (date)" When performing tests. Mark Construction Checklists in the appropriate place as indicated Project events are completed, and provide pertinent details and other information.

B. Systems Required to Be Commissioned:

1. Instrumentation and control for electrical systems.
2. Instrumentation and control for lighting control systems.
3. Instrument transformers.
4. Switchgear and switchboard assemblies rated 1200 A or greater.
5. Motor-control centers.
6. Metering devices.
7. Low-voltage power circuit breakers.
8. Grounding systems.
9. Panelboards.
10. Lighting.

3.5 Cx TESTING PREPARATION

A. Refer to "Testing Procedures" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for preparation requirements prior to Functional Testing.

3.6 ELECTRICAL TESTING REQUIREMENTS

A. In addition to the requirements in the "General Testing Requirements" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems", provide the following:

1. Include entire electrical installation, from central equipment through distribution systems, to each space. Testing must include measuring capacities and effectiveness of operational and control functions.

2. Prepare detailed testing plans, procedures, and checklists for electrical systems, subsystems, and equipment in conjunction with the CxA. Contractor to ensure the participation of the electrical Subcontractor, HVAC controls Subcontractor and the fire alarm Subcontractor as needed for this work.
3. If tests cannot be completed because of a deficiency outside the scope of the electrical system, document the deficiency and report it to the Commissioner. After deficiencies are resolved, reschedule tests.

3.7 Cx TEST CONDITIONS

A. Refer to "General Testing Requirements" Article, and "Testing Procedures" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for satisfying Cx requirements related to testing.

3.8 ELECTRICAL SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in individual Division 26 sections. Provide submittals, test data, inspector record, and certifications to the CxA.

B. Electrical Tests: Test requirements are specified in Division 26. Electrical Subcontractor will execute and record results for all megger, continuity, or other electrical tests. Contractor to provide reports to the CxA.

3.9 Cx TESTS COMMON TO ELECTRICAL SYSTEMS

A. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions, to verify compliance with acceptance criteria.

B. Test systems, assemblies, subsystems, equipment, and components for operating modes, interlocks, control responses, responses to abnormal or emergency conditions, and response in accordance with acceptance criteria.

C. Coordinate schedule with, and perform Cx activities at the direction of, CxA.

D. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance test requirements specified in Division 26 Sections specifying electrical systems and equipment.

E. Provide technicians, instrumentation, tools, and equipment to perform and document the following:

1. Cx Construction Checklist verification tests.
2. Cx Construction Checklist verification test demonstrations.

3.10 Cx TESTS FOR ELECTRICAL SYSTEMS

A. Verification of Normal Electrical System Operation:

1. Prerequisites: Acceptance of results for Construction Checklists for Division 26 electrical components associated with Normal electrical system.

2. Equipment and Systems to Be Tested: Division 26 electrical equipment.
3. Test Purpose: Verify operation of Normal electrical system.
4. Test Conditions: Energize components of Normal electrical system, one at a time.
5. Acceptance Criteria: Proper operation of Normal electrical system over a 24 hour period.

B. Test Purpose: Verify operation of control and monitoring systems for Normal and Essential electrical systems.

C. Test Conditions:

1. Energize components of Normal electrical system.
2. Test operation of equipment.

D. Acceptance Criteria: Operation of equipment according to OPR.

3.11 GUARANTY REVIEW / SEASONAL TESTING

A. Refer to "Guaranty Review / Seasonal Testing" Article in DDC General Conditions Section 019113 "General Commissioning Requirements for MEP Systems" for guaranty review and seasonal testing requirements.

END OF SECTION 260800

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Electronic dial-time switches.
2. Daylight-harvesting switching controls.
3. Daylight-harvesting dimming controls, digital.
4. Indoor occupancy and vacancy sensors.
5. Switchbox-mounted occupancy sensors.
6. Lighting contactors.
7. Emergency shunt relay.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 262726 "Wiring Devices" for wall-box dimmers, non-networkable wall-switch occupancy sensors, and manual light switches.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Electronic dial-time switches.
2. Daylight-harvesting switching controls.
3. Daylight-harvesting dimming controls, digital.
4. Indoor occupancy and vacancy sensors.
5. Switchbox-mounted occupancy sensors.
6. Lighting contactors.
7. Emergency shunt relay.

B. Shop Drawings:

1. Show installation details for the following:

    a. Occupancy sensors.
    b. Vacancy sensors.

2. Interconnection diagrams showing field-installed wiring.
3. Include diagrams for power, signal, and control wiring.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 WARRANTY

A. Special Warranty: Manufacturer warrants that installed lighting control devices perform in accordance with specified requirements and agrees to repair or replace, including labor, materials, and equipment, devices that fail to perform as specified within warranty period.

1. Failures include, but are not limited to, the following:

    a. Faulty operation of lighting control software.
    b. Faulty operation of lighting control devices.

2. Warranty Period: Four year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ELECTRONIC DIAL-TIME SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Intermatic, Inc.
2. NSi Industries LLC.
3. Schneider Electric USA, Inc.
4. Or approved equal.

B. Description: Solid state, programmable, with alphanumeric display; complying with UL 917.

1. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory and marked for intended location and application.
2. Contact Configuration: DPDT.
3. Contact Rating: 20 A ballast load, 120/240 V(ac).
4. Programs:

    a. Insert configuration and an annual holiday schedule that overrides the weekly operation on holidays.

5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.
6. Astronomic Time: All channels.
7. Automatic daylight savings time changeover.

2.2 DAYLIGHT-HARVESTING DIMMING CONTROLS, DIGITAL

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hubbell Control Solutions; Hubbell Incorporated, Lighting.
2. Lithonia Lighting; Acuity Brands Lighting, Inc.
3. WattStopper; Legrand North America, LLC.
4. Or approved equal.

B. Description: Sensing daylight and electrical lighting levels, the system adjusts the indoor electrical lighting levels. As daylight increases, lights are dimmed.

1. Lighting control set point is based on the following two lighting conditions:

   a. When no daylight is present (target level).
   b. When significant daylight is present.

2. System programming is done with two hand-held, remote-control tools.

   a. Initial setup tool.
   b. Tool for occupants to adjust the target levels by increasing the set point up to 25 percent, or by minimizing the electric lighting level.

C. Ceiling-Mounted Dimming Controls: Solid-state, light-level sensor unit, with separate power pack, to detect changes in indoor lighting levels that are perceived by the eye.

D. Electrical Components, Devices, and Accessories:

1. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory and marked for intended location and application.
2. Sensor Output: zero to 10 V(dc) to operate luminaires. Sensor is powered by controller unit.
3. Light-Level Sensor Set-Point Adjustment Range: 20 to 60 fc.

E. Power Pack: Digital controller capable of accepting as defined on the drawings. 8PSJ inputs with output(s) rated for 20 A LED load at 120 and 277 V(ac), for at 120 and 277 V(ac), and for at 120 V(ac). Sensor has 24 V(dc) Class 2 power source.

1. With integral current monitoring.
2. Compatible with digital addressable lighting interface.
3. Plenum rated.

2.3 INDOOR OCCUPANCY AND VACANCY SENSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Lithonia Lighting; Acuity Brands Lighting, Inc.

2. Sensor Switch, Inc.
3. WattStopper; Legrand North America, LLC.
4. Or approved equal.

B. General Requirements for Sensors:

1. Ceiling-mounted, solid-state indoor occupancy vacancy sensors.
2. Dual technology.
3. Separate power pack.
4. Hardwired connection to switch.
5. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory and marked for intended location and application.
6. Operation:

    a. Combination Sensor: Unless otherwise indicated, sensor must be programmed to turn lights on when coverage area is occupied and turn them off when unoccupied, or to turn off lights that have been manually turned on; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.

7. Sensor Output: Sensor is powered from the power pack.
8. Power: Line voltage.
9. Power Pack: Dry contacts rated for 20 A LED load at 120 and 277 V(ac), for 13 A tungsten at 120 V(ac), and for 1 hp at 120 V(ac). Sensor has 24 V(dc), 150 mA, Class 2 power source.
10. Mounting:

    a. Sensor: Suitable for mounting in any position in a standard device box or outlet box.
    b. Relay: Externally mounted through a 1/2 inch knockout in a standard electrical enclosure.
    c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

11. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
12. Bypass Switch: Override the "on" function in case of sensor failure.
13. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.

C. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6 inch minimum movement of any portion of a human body that presents a target of not less than 36 sq. inch, and detect a person of average size and weight moving not less than 12 inch in either a horizontal or a vertical manner at an approximate speed of 12 inch/s.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96 inch high ceiling.

2.4 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Leviton Manufacturing Co., Inc.
2. Lithonia Lighting; Acuity Brands Lighting, Inc.
3. Philips; Signify North America; Signify Holding.
4. Sensor Switch, Inc.
5. WattStopper; Legrand North America, LLC.
6. Or approved equal.

B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchboxusing hardwired connection.

1. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory and marked for intended location and application.
2. Occupancy Sensor Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn lights off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
3. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
4. Switch Rating: Not less than 800 VA load at 120 V, 1200 VA LED load at 277 V, and 800 W incandescent.

C. Wall-Switch Sensor Tag WS1:

1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 2100 sq. ft..
2. Sensing Technology: Dual technology - PIR and ultrasonic.
3. Switch Type: SP. Capable of controlling load in three-way application.
4. Voltage: 120 V.
5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
6. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
7. Faceplate: Color matched to switch.

D. Wall-Switch Sensor Tag WS2: Vacancy

1. Standard Range: 210-degree field of view, with a minimum coverage area of 900 sq. ft..
2. Sensing Technology: PIR.
3. Switch Type: SP, manual "on," automatic "off." Capable of controlling load in three-way application.
4. Voltage: 120 V.
5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
7. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
8. Faceplate: Color matched to switch.

2.5 HIGH-BAY OCCUPANCY SENSORS

A. Description: Solid-state unit. The unit is designed to operate with the lamp and ballasts indicated.

1. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory and marked for intended location and application.
2. Operation: Turn lights on when coverage area is occupied, and to half-power when unoccupied; with a time delay for turning lights to half-power that is adjustable over a minimum range of 1 to 16 minutes.
3. Continuous Lamp Monitoring: When lamps are dimmed continuously for 24 hours, automatically turn lamps on to full power for 15 minutes for every 24 hours of continuous dimming.
4. Power: Line voltage.
5. Operating Ambient Conditions: 32 to 149 deg F.
6. Mounting: Threaded pipe.
7. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
8. Detector Technology: PIR.

B. Detector Coverage: User selectable by interchangeable PIR lenses, suitable for mounting heights from 12 to 50 ft..

C. Accessories: Obtain manufacturer's installation and maintenance kit with laser alignment tool for sensor positioning and power port connectors.

2.6 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION OF SENSORS

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's instructions.

3.4 INSTALLATION OF CONTACTORS

A. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.5 INSTALLATION OF WIRING

A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.

B. Wiring within Enclosures: Separate power-limited and nonpower-limited conductors in accordance with conductor manufacturer's instructions.

C. Size conductors in accordance with lighting control device manufacturer's instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, device, and outlet boxes; terminal cabinets; and equipment enclosures.

3.6 IDENTIFICATION

A. Identify components and power and control wiring in accordance with Section 260553 "Identification for Electrical Systems.

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.7 FIELD QUALITY CONTROL

A. Field tests must be witnessed by Commissioner.

B. Tests and Inspections:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Nonconforming Work:

1. Lighting control devices will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Prepare test and inspection reports.

E. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.8 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit City of New York's operations.
2. For daylighting controls, adjust set points and deadband controls to suit City of New York's operations.
3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.9 MAINTENANCE

A. Software and Firmware Service Agreement:

1. Technical Support: Beginning at Substantial Completion, verify that software and firmware service agreement includes software support for oner year.
2. Upgrade Service: At Substantial Completion, update software and firmware to latest version. Install and program software upgrades that become available within one year from date of Substantial Completion. Verify upgrading software includes operating system and new or revised licenses for using software.

   a. Upgrade Notice: No fewer than 30 days to allow City of New York to schedule and access the system and to upgrade computer equipment if necessary.

3. Upgrade Reports: Prepare written report after each update, documenting upgrades installed.

END OF SECTION 260923

SECTION 262213 - LOW-VOLTAGE DISTRIBUTION TRANSFORMERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Distribution, dry-type transformers with nominal primary and secondary rating of 600 V and less, with capacities up to 1500 kVA.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type and size of transformer.
b. Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer.

B. Field Quality-Control Submittals:

1. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inspection: On receipt, inspect for and note shipping damage to packaging and transformer.

1. If manufacturer packaging is removed for inspection, and transformer will be stored after inspection, re-package transformer using original or new packaging materials that provide protection equivalent to manufacturer's packaging.

B. Storage: Store in warm, dry, and temperature-stable location in original shipping packaging.

C. Temporary Heating: Apply temporary heat in accordance with manufacturer's published instructions within enclosure of ventilated-type units, throughout periods during which equipment is not energized and when transformer is not in space that is continuously under normal control of temperature and humidity.

D. Handling: Follow manufacturer's instructions for lifting and transporting transformers.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Products Division.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; Schneider Electric USA.
4. Or approved equal.

B. Source Limitations: Obtain each type of transformer from single source from single manufacturer.

2.2 GENERAL TRANSFORMER REQUIREMENTS

A. Description: Factory-assembled and -tested, air-cooled units for 60 Hz service.

B. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.

C. Transformers Rated 15 kVA and Larger:

1. Comply with 10 CFR 431 (DOE 2016) efficiency levels.
2. Marked as compliant with DOE 2016 efficiency levels by qualified electrical testing laboratory.

D. Shipping Restraints: Paint or otherwise color-code bolts, wedges, blocks, and other restraints that are to be removed after installation and before energizing. Use fluorescent colors that are easily identifiable inside transformer enclosure.

2.3 DISTRIBUTION TRANSFORMERS

A. Comply with NFPA 70, and list and label as complying with UL 1561.

B. Cores: Electrical grade, non-aging silicon steel with high permeability and low hysteresis losses.

1. One leg per phase.
2. Core volume must allow efficient transformer operation at 10 percent above nominal tap voltage.
3. Grounded to enclosure.

C. Coils: Continuous windings without splices except for taps.

1. Coil Material: Copper.
2. Internal Coil Connections: Brazed or pressure type.
3. Terminal Connections: Welded.

D. Enclosure: Ventilated.

1. Core and coil must be encapsulated within resin compound using vacuum-pressure impregnation process to seal out moisture and air.
2. KVA Ratings: Based on convection cooling only and not relying on auxiliary fans.
3. Wiring Compartment: Sized for conduit entry and wiring installation.
4. Environmental Protection:

a. Indoor: UL 50E, Type 2.

5. Finish Color: Gray weather-resistant enamel.

E. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and four 2.5 percent taps below normal full capacity.

F. Insulation Class, 30 kVA and Larger: 220 deg C, UL-component-recognized insulation system with maximum of 115 deg Crise above 40 deg C ambient temperature.

G. Grounding: Provide ground-bar kit or ground bar installed on inside of transformer enclosure.

2.4 IDENTIFICATION

A. Nameplates:

1. Engraved, laminated-acrylic or melamine plastic signs for distribution transformers, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 260553 "Identification for Electrical Systems."

2.5 SOURCE QUALITY CONTROL

A. Testing Administrant: Engage qualified electrical testing agency to evaluate transformer.

B. Factory Tests and Inspections: Test and inspect assembled system, by, or under supervision of, qualified electrical testing laboratory, in accordance with IEEE C57.12.01 and IEEE C57.12.91 before delivering to site. Affix label with name and date of manufacturer's certification of system compliance on control units.

1. Resistance measurements of windings at rated voltage connections and at tap connections.
2. Ratio tests at rated voltage connections and at tap connections.
3. Phase relation and polarity tests at rated voltage connections.
4. No load losses, and excitation current and rated voltage at rated voltage connections.
5. Impedance and load losses at rated current and rated frequency at rated voltage connections.
6. Applied and induced tensile tests.
7. Regulation and efficiency at rated load and voltage.
8. Insulation-Resistance Tests:

   a. Line-side to ground.
   b. Load-side to ground.
   c. Line-side to load-side.

9. Temperature tests.
10. Factory Sound-Level Tests: Conduct sound-level tests on equipment for this Project.

C. Nonconforming Work:

1. System equipment that does not pass tests and inspections will be considered defective.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for transformers.

B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's published instructions.

C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.

D. Verify that ground connections are in place and requirements in Section 260526 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance must be 5 Ω at location of transformer.

E. Environment: Enclosures must be rated for environment in which they are located. Covers for UL 50E, Type 4X enclosures may not cause accessibility problems.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install transformers level and plumb on concrete base with vibration-dampening supports. Locate transformers away from corners and not parallel to adjacent wall surface.

B. Construct concrete bases and anchor floor-mounted transformers in accordance with manufacturer's published instructions, seismic requirements applicable to Project, and requirements in Section 260529 "Hangers and Supports for Electrical Systems."

1. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

C. Secure transformer to concrete base in accordance with manufacturer's published instructions.

D. Secure covers to enclosure and tighten bolts to manufacturer-recommended torques to reduce noise generation.

E. Remove shipping bolts, blocking, and wedges.

3.4 CONNECTIONS

A. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

B. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Tighten electrical connectors and terminals in accordance with manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

D. Provide flexible connections at conduit and conductor terminations and supports to eliminate sound and vibration transmission to building structure.

3.5 ADJUSTING

A. Record transformer secondary voltage at unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 5 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

B. Output Settings Report: Prepare written report recording output voltages and tap settings.

3.6 CLEANING

A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

3.7 FOLLOW UP SERVICE

A. Infrared Scanning: Two months after Substantial Completion, perform infrared scan of transformer connections.

1. Use infrared-scanning device designed to measure temperature or detect significant deviations from normal values. Provide documentation of device calibration.
2. Perform two follow-up infrared scans of transformers, one at four months and another at 11 months after Substantial Completion.
3. Prepare certified report identifying transformer checked and describing results of scanning. Include notation of deficiencies detected, remedial actions taken, and scanning observations after remedial action.

END OF SECTION 262213

SECTION 262413 - SWITCHBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Switchboards.
2. Disconnecting and overcurrent protective devices.
3. Instrumentation.

B. Related Requirements

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 COORDINATION

A. Coordinate layout and installation of switchboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Switchboards.
2. Overcurrent protective devices.
3. Surge protection devices.
4. Groud-fault protection devices.
5. Accessories.

6. Other components.
7. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

B. Shop Drawings: For each switchboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types for types other than UL 50E, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Detail short-circuit current rating of switchboards and overcurrent protective devices.
5. Include descriptive documentation of optional barriers specified for electrical insulation and isolation.
6. Detail utility company's metering provisions with indication of approval by utility company.
7. Include evidence of listing, by qualified electrical testing laboratory for series rating of installed devices.
8. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
9. Include time-current coordination curves for each type and rating of overcurrent protective device included in switchboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.
10. Include diagram and details of proposed mimic bus.
11. Include schematic and wiring diagrams for power, signal, and control wiring.

C. Field Quality-Control Submittals:

1. Field Quality-Control Reports:

a. Test procedures used.
b. Test results that comply with requirements.
c. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Handling, storing, and providing temporary heat.
2. Mounting accessories and anchoring devices.
3. Testing and adjusting overcurrent protective devices.

B. Sample warranties.

1.7 CLOSEOUT SUBMITTALS

A. Warranty documentation.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver switchboards in sections or lengths that can be moved past obstructions in delivery path.

B. Remove loose packing and flammable materials from inside switchboards and install temporary electric heating (250 W per section) to prevent condensation.

C. Handle and prepare switchboards for installation in accordance with NECA 400.

1.10 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that switchboard performs in accordance with specified requirements and agrees to provide repair or replacement of components that fail to perform as specified within warranty period.

1. Warranty Period: Three years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 SWITCHBOARDS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Eaton or comparable product by one of the following:

1. Siemens Industry, Inc., Energy Management Division.
2. Square D; Schneider Electric USA.
3. Or approved equal.

B. Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards including clearances between switchboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.

E. Comply with NEMA PB 2.

F. Comply with NFPA 70.

G. Comply with UL 891.

H. Front-Connected, Front-Accessible Switchboards:

1. Main Devices: Panel Fixed, individually mounted.
2. Branch Devices: Panel mounted.
3. Sections front and rear aligned.

I. Indoor Enclosures: Steel, UL 50E, Type 1 .

J. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over rust-inhibiting primer on treated metal surface.

K. Barriers: Between adjacent switchboard sections.

L. Insulation and isolation for main bus of main section and main and vertical buses of feeder sections.

M. Service Entrance Rating: Switchboards intended for use as service entrance equipment may contain from one to six service disconnecting means with overcurrent protection, neutral bus with disconnecting link, grounding electrode conductor terminal, and main bonding jumper.

N. Utility Metering Compartment: Barrier compartment and section complying with utility company's requirements; hinged sealable door; buses provisioned for mounting utility company's current transformers and potential transformers or potential taps as required by utility company. If separate vertical section is required for utility metering, match and align with basic switchboard. Provide service entrance label and necessary applicable service entrance features.

O. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.

P. Pull Box on Top of Switchboard:

1. Adequate ventilation to maintain temperature in pull box within same limits as switchboard.
2. Set back from front to clear circuit-breaker removal mechanism.
3. Removable covers may form top, front, and sides. Top covers at rear must be easily removable for drilling and cutting.
4. Bottom must be insulating, fire-resistive material with separate holes for cable drops into switchboard.
5. Cable supports must be arranged to facilitate cabling and adequate to support cables indicated, including those for future installation.

Q. Buses and Connections: Three phase, four wire unless otherwise indicated.

1. Provide phase bus arrangement A, B, C from front to back, top to bottom, and left to right when viewed from front of switchboard.
2. Phase- and Neutral-Bus Material:

   a. Hard-drawn copper of 98 percent conductivity.
3. Load Terminals: Insulated, rigidly braced, runback bus extensions, of same material as through buses, equipped with mechanical connectors for outgoing circuit conductors. Provide load terminals for future circuit-breaker positions at full-ampere rating of circuit-breaker position.

4. Ground Bus: Minimum-size required by UL 891, hard-drawn copper of 98 percent conductivity, equipped with mechanical connectors for feeder and branch-circuit ground conductors.
5. Main-Phase Buses and Equipment-Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.

6. Neutral Buses: 100 percent of ampacity of phase buses unless otherwise indicated, equipped with mechanical connectors for outgoing circuit neutral cables. Brace bus extensions for busway feeder neutral bus.
7. Isolation Barrier Access Provisions: Permit checking of bus-bolt tightness.

R. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

S. Bus-Bar Insulation: Factory-applied, flame-retardant, tape wrapping of individual bus bars or flame-retardant, spray-applied insulation. Minimum insulation temperature rating of 105 deg C.

T. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components including instruments and instrument transformers.

2.2 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

B. Fuses are specified in Section 262813 "Fuses."

2.3 INSTRUMENTATION

A. Instrument Transformers: NEMA EI 21.1, and the following:

1. Current Transformers: NEMA EI 21.1; 5 A, 60 Hz, secondary; type; secondary winding and secondary shorting device. Burden and accuracy must be consistent with connected metering and relay devices.
2. Current Transformers for Neutral and Ground-Fault Current Sensing: Connect secondary wiring to ground overcurrent relays, via shorting terminals, to provide selective tripping of main and tie circuit breaker. Coordinate with feeder circuit-breaker, ground-fault protection.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Receive, inspect, handle, and store switchboards in accordance with NECA 400.

1. Lift or move panelboards with spreader bars and manufacturer-supplied lifting straps following manufacturer's published instructions.

2. Use rollers, slings, or other manufacturer-approved methods if lifting straps are not furnished.
3. Protect from moisture, dust, dirt, and debris during storage and installation.
4. Install temporary heating during storage in accordance with manufacturer's published instructions.

B. Examine switchboards before installation. Reject switchboards that are moisture damaged or physically damaged.

C. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance of the Work or that affect performance of equipment.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving switchboards into place.

3.4 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Switchboards and Accessories: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NECA 400.
2. Consult Commissioner for resolution of conflicting requirements.

C. Special Techniques:

1. Equipment Mounting: Install switchboards on concrete base, 4 inch nominal thickness. Comply with requirements for concrete base specified in Section 260529 "Hangers and Supports for Electrical Systems."

    a. Install conduits entering underneath switchboard, entering under vertical section where conductors will terminate. Install with couplings flush with concrete base. Extend 2 inch above concrete base after switchboard is anchored in place.
    b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18 inch centers around full perimeter of concrete base.
    c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
    d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, published instructions, and directions furnished with items to be embedded.
    e. Install anchor bolts to elevations required for proper attachment to switchboards.
    f. Anchor switchboard to building structure at top of switchboard if required or recommended by manufacturer.

2. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, straps and brackets, and temporary blocking of moving parts from switchboard units and components.

3. Operating Instructions: Frame and mount printed basic operating instructions for switchboards, including control and key interlocking sequences and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.
4. Install filler plates in unused spaces of panel-mounted sections.
5. Install overcurrent protective devices, surge protection devices, and instrumentation.

    a. Set field-adjustable switches and circuit-breaker trip ranges.

6. Install spare-fuse cabinet.

3.5 CONNECTIONS

A. Bond conduits entering underneath switchboard to equipment ground bus with bonding conductor sized in accordance with NFPA 70.

B. Support and secure conductors within switchboard in accordance with NFPA 70.

C. Extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run.

3.6 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Switchboard Nameplates: Label each switchboard compartment with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

C. Device Nameplates: Label each disconnecting and overcurrent protective device and each meter and control device mounted in compartment doors with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Mimic Bus:

1. Entire single-line switchboard bus work, as depicted on factory record drawing, on minimum 0.032 inch thick anodized aluminum photoengraved nameplate, located at eye level on front cover of switchboard incoming service section.
2. Entire single-line switchboard bus work, as depicted on factory record drawing, on engraved minimum 0.0625 inch thick laminated-plastic nameplate, located at eye level on front cover of switchboard incoming service section.
3. Continuously integrated mimic bus factory applied to front of switchboard. Arrange in single-line diagram format, using symbols and letter designations consistent with final mimic-bus diagram.
4. Coordinate mimic-bus segments with devices in switchboard sections to which they are applied. Produce concise visual presentation of principal switchboard components and connections.
5. Presentation Media: Painted graphics in color contrasting with background color to represent bus and components, complete with lettered designations.

E. Service Equipment Label: Labeled, by qualified electrical testing laboratory for use as service equipment for switchboards with one or more service disconnecting and overcurrent protective devices.

3.7 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Acceptance Testing:

a. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit. Open control and metering circuits within switchboard, and remove neutral connection to surge protection and other electronic devices prior to insulation test. Reconnect after test.
b. Test continuity of each circuit.

2. Test ground-fault protection of equipment for service equipment in accordance with NFPA 70.
3. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
4. Correct malfunctioning units on-site where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
5. Perform the following infrared scan tests and inspections, and prepare reports:

a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared scan of each switchboard. Remove front panels so joints and connections are accessible to portable scanner.
b. Follow-up Infrared Scanning: Perform additional follow-up infrared scan of each switchboard 11 months after date of Substantial Completion.
c. Instruments and Equipment:

1) Use infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

6. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

C. Nonconforming Work:

1. Switchboard will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Collect, assemble, and submit test and inspection reports, including certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

E. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.8 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

3.9 PROTECTION

A. Temporary Heating: Apply temporary heat, to maintain temperature in accordance with manufacturer's published instructions, until switchboard is ready to be energized and placed into service.

END OF SECTION 262413

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Power panelboards.
2. Lighting and appliance branch-circuit panelboards.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 DEFINITIONS

A. GFEP: Ground-fault equipment protection.

B. MCCB: Molded-case circuit breaker.

C. VPR: Voltage protection rating.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Power panelboards.
2. Lighting and appliance branch-circuit panelboards.
3. Disconnecting and overcurrent protective devices.
4. Include materials, switching and overcurrent protective devices, accessories, and components indicated.
5. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.
5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Include evidence of listing, by qualified electrical testing laboratory for series rating of installed devices.
7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
8. Include wiring diagrams for power, signal, and control wiring.
9. Key interlock scheme drawing and sequence of operations.
10. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device. Include Internet link for electronic access to downloadable PDF of coordination curves.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

1.6 INFORMATIONAL SUBMITTALS

A. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

B. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Recommended procedures for installing panelboards.
2. Recommended torque settings for bolted connections on panelboards.
3. Recommended temperature range for energizing panelboards.

1.7 CLOSEOUT SUBMITTALS

A. Warranty documentation.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation in accordance with NEMA PB 1.

1.10 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that panelboards perform in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within warranty period.

1. Warranty Period: Four years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

A. Enclosures: Flush-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: UL 50E, Type 1.

2. Height: 7 ft maximum.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims must cover live parts and may have no exposed hardware.
4. Finishes:

a. Panels and Trim: galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
b. Back Boxes: Galvanized steel.

B. Incoming Mains:

1. Location: Top.
2. Main Breaker: Main lug interiors up to 400 A must be field convertible to main breaker.

C. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.

a. Plating must run entire length of bus.
b. Bus must be fully rated for entire length.

2. Interiors must be factory assembled into unit. Replacing switching and protective devices may not disturb adjacent units or require removing main bus connectors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure.
5. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and listed and labeled, by qualified electrical testing laboratory as suitable for nonlinear loads in electronic-grade panelboards and others designated on Drawings. Connectors must be sized for double-sized or parallel conductors as indicated on Drawings.
6. Do not mount neutral bus in gutter.

D. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Terminations must allow use of 75 deg C rated conductors without derating.
3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
4. Main and Neutral Lugs: Mechanical type, with lug on neutral bar for each pole in panelboard.
5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with lug on bar for each pole in panelboard.
6. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

E. Quality-Control Label: Panelboards or load centers must be labeled, by qualified electrical testing laboratory recognized for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers must have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

F. Panelboard Short-Circuit Current Rating:

1. Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed, by qualified electrical testing laboratory for 100 percent interrupting capacity.

   a. Panelboards and overcurrent protective devices rated 240 V or less must have short-circuit ratings as shown on Drawings, but not less than 10 000 A(rms) symmetrical.
   b. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V must have short-circuit ratings as shown on Drawings, but not less than 14 000 A(rms) symmetrical.

2.2 POWER PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. ESL Power Systems, Inc.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; Schneider Electric USA.
5. Or approved equal.

B. Listing Criteria: NEMA PB 1, distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inch high, provide two latches, keyed alike.

D. Mains: Circuit breaker.

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Plug-in circuit breakers.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; Schneider Electric USA.
4. Or approved equal.

B. Listing Criteria: NEMA PB 1, lighting and appliance branch-circuit type.

C. Branch Overcurrent Protective Devices: Plug-in circuit breakers, replaceable without disturbing adjacent units.

D. Doors: Door-in-door construction with concealed hinges; secured with flush latch with tumbler lock; keyed alike. Outer door must permit full access to panel interior. Inner door must permit access to breaker operating handles and labeling, but current carrying terminals and bus must remain concealed.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

B. Receive, inspect, handle, and store panelboards in accordance with NECA 407 NEMA PB 1.1.

C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Panelboards: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NECA 407 NEMA PB 1.1.
2. Consult Commissioner for resolution of conflicting requirements.

C. Special Techniques:

1. Equipment Mounting:

   a. Install panelboards on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
   b. Attach panelboard to vertical finished or structural surface behind panelboard.
   c. Mount surface-mounted panelboards to steel slotted supports 1-1/4 inch in depth. Orient steel slotted supports vertically.

2. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
3. Mount top of trim 7.5 ft above finished floor unless otherwise indicated.
4. Mount panelboard cabinet plumb and rigid without distortion of box.
5. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
6. Install overcurrent protective devices and controllers not already factory installed.

   a. Set field-adjustable, circuit-breaker trip ranges.
   b. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver in accordance with manufacturer's published instructions.

7. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
8. Install filler plates in unused spaces.
9. Stub four 1 inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in future. Stub four 1 inch empty conduits into raised floor space or below slab not on grade.
10. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.
11. Mount spare fuse cabinet in accessible location.

D. Interfaces with Other Work:

1. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

3.4 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Panelboard Nameplates: Label each panelboard with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

C. Device Nameplates: Label each branch circuit device in power panelboards with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

E. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles must be located on interior of panelboard door.

F. Breaker Labels: Faceplate must list current rating, UL and IEC certification standards, and AIC rating.

G. Circuit Directory:

1. Provide directory card inside panelboard door, mounted in transparent card holder.

   a. Circuit directory must identify specific purpose with detail sufficient to distinguish it from other circuits.

2. Provide computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.

   a. Circuit directory must identify specific purpose with detail sufficient to distinguish it from other circuits.

3. Create directory to indicate installed circuit loads after balancing panelboard loads; incorporate City of New York's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

3.5 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Field tests and inspections must be witnessed by Commissioner.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS, Paragraph 7.6 Circuit Breakers. Do not perform optional tests. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
b. Follow-up Infrared Scanning: Perform additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
c. Instruments and Equipment:

1) Use infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

D. Nonconforming Work:

1. Panelboards will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

E. Collect, assemble, and submit test and inspection reports, including certified report that identifies panelboards included and that describes scanning results, with comparisons of two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

F. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.6 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as indicated.

C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes. Prior to making circuit changes to achieve load balancing, inform Commissioner of effect on phase color coding.

1. Measure loads during period of normal facility operations.
2. Perform circuit changes to achieve load balancing outside normal facility operation schedule or at times directed by Commissioner. Avoid disrupting services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After changing circuits to achieve load balancing, recheck loads during normal facility operations. Record load readings before and after changing circuits to achieve load balancing.
4. Tolerance: Maximum difference between phase loads, within panelboard, may not exceed 20 percent.

3.7 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature in accordance with manufacturer's published instructions.

END OF SECTION 262416

SECTION 262713 - ELECTRICITY METERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Work to accommodate utility company revenue meters, and City of New York's electricity meters used to manage electrical power system.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 DEFINITIONS

A. KY or KYZ Pulse: Term used by metering industry to describe method of measuring consumption of electricity (kWh) that is based on relay opening and closing in response to rotation of disk in meter. Electronic meters generate pulses electronically.

1.4 COORDINATION

A. Electrical Service Connections:

1. Coordinate with utility companies and utility-furnished components.

a. Comply with requirements of utility providing electrical power services.
b. Coordinate installation and connection of utilities and services, including provision for electricity-metering components.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data:

1. For metering infrastructure components.

B. Shop Drawings: For electricity-metering equipment.

1. Include elevation views of front panels of control and indicating devices and control stations.
2. Include diagrams for power, signal, and control wiring.
3. Wire Termination Diagrams and Schedules: Include diagrams for power, signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features. Differentiate between manufacturer-installed and field-installed wiring.
4. Include series-combination rating data for modular meter centers with main disconnect device.
5. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices used. Describe characteristics of network and other data communication lines.

C. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Software and firmware service agreement.

B. Warranty documentation.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that metering equipment performs in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within warranty period.

1. Warranty Period: Three years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

B. Comply with UL 916.

2.2 UTILITY METERING INFRASTRUCTURE

A. Install metering accessories furnished by utility company, complying with its requirements.

B. Utility-Furnished Meters: Connect data transmission facility of metering equipment installed by Utility.

C. Current-Transformer Cabinets: Comply with requirements of electrical-power utility company.

D. Meter Sockets:

1. Comply with requirements of electrical-power utility company.
2. Steady-state and short-circuit current ratings must meet indicated circuit ratings.

E. Modular Meter Center: Factory-coordinated assembly of main service disconnect device, wireways, meter socket modules, and feeder circuit breakers arranged in adjacent vertical sections complete with interconnecting buses.

1. Comply with requirements of utility company for meter center.

a. Comply with UL 67.

2. Housing: UL 50E, Type 1 enclosure.
3. Meter Socket Rating: Coordinated with connected feeder circuit rating.
4. Minimum Short-Circuit Rating: 42 000 A symmetrical at rated voltage.
5. Main Disconnect Device:

a. Fusible switch, UL 98 Type GD, series-combination rated by fuse manufacturer to protect downstream feeder and branch circuit breakers. Comply with requirements in Section 262816 "Enclosed Switches and Circuit Breakers." Switch must be operable from outside enclosure to disconnect unit. Configure cover so that it can be opened only when disconnect switch is open.

F. Arc-Flash Warning Labels;

1. Comply with requirements for "Self-Adhesive Equipment Labels" and "Signs" in Section 260553 "Identification for Electrical Systems." Apply 3-1/2-by-5 inch thermal transfer label of high-adhesion polyester for each work location included in the analysis. Labels must be machine printed, with no field-applied markings.

a. Label must have orange header with wording, "WARNING, ARC-FLASH HAZARD," and must include the following information taken directly from arc-flash hazard analysis:

1) Location designation.
2) Nominal voltage.
3) Flash protection boundary.
4) Hazard risk category.
5) Incident energy.
6) Working distance.
7) Engineering report number, revision number, and issue date.

2.3 ELECTRICITY METERS

A. System Description: Able to meter designated activity loads, with or without external alarm, control, and communication capabilities, or other optional features.

B. General Requirements for Meters:

1. Comply with NEMA ANSI C12.1 and NEMA ANSI C12.20, 0.1 accuracy class.
2. Ambient Temperature: Minus 22 deg F to plus 158 deg F.
3. Humidity: Zero to 95 percent, noncondensing.
4. Capacities and Characteristics:

a. Circuit: 120/208 V(ac), 3000 A.
b. Measure: kWh, onboard LED display.
c. Remote-Reading Options: None.

5. Enclosure: Supplied by meter manufacturer, UL 50E, Type 1 minimum, with provisions for locking or sealing.
6. Identification: Comply with requirements in Section 260553 "Identification for Electrical Systems."

C. Current-Transformer Cabinet: Size and configuration as recommended by metering equipment manufacturer for use with indicated connected feeder and sensors.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Install modular meter center according to switchboard installation requirements in NECA 400.
2. Install arc-flash labels as required by NFPA 70.

C. Special Techniques:

1. Install meters furnished by utility company. Install raceways and equipment according to utility company's published instructions. Provide empty conduits for metering leads and extend grounding connections as required by utility company.
2. Wiring Methods:

a. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533.13 "Conduits for Electrical Systems."

b. Install unshielded, twisted-pair cable for control and signal transmission conductors, complying with Section 271513 "Communications Copper Horizontal Cabling."
c. Minimum conduit size is metric designator 16 (trade size 1/2).

3.3 IDENTIFICATION

A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

1. Series Combination Warning Label: Self-adhesive labels, with text as required by NFPA 70.
2. Equipment Identification Labels: Self-adhesive labels with clear protective overlay.

3.4 PROTECTION

A. After installation, protect metering equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

END OF SECTION 262713

SECTION 262716 - ELECTRICAL CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Cabinets and cutout boxes.
2. Termination boxes.
3. Miscellaneous enclosures.

B. Products Installed, but Not Furnished, under This Section:

1. See Section 260553 "Identification for Electrical Systems" for equipment labels.

C. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 DEFINITIONS

A. RBB: Rack bonding busbar, located in equipment cabinets and racks.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Cabinets and cutout boxes.
2. Termination boxes.
3. Miscellaneous enclosures.

B. Shop Drawings:

1. Shop drawings for custom enclosures and cabinets.
2. Shop drawings for racks or frames.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 CABINETS AND CUTOUT BOXES

A. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

2. Listing Criteria:

a. UL CCN CYIV.
b. Non-Environmental Characteristics: UL 50.
c. Environmental Characteristics: UL 50E.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL CYIV - Indoor Sheet Metal Cabinets :

1. General Characteristics: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
2. Options:

a. Degree of Protection: Type 1.

D. UL CYIV - Indoor Sheet Metal Cutout Boxes :

1. General Characteristics: Enclosure that has swinging doors or covers secured directly to and telescoping with walls of enclosure.
2. Options:

a. Degree of Protection: Type 1.

E. UL CYIV - Outdoor Sheet Metal Cabinets :

1. General Characteristics: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
2. Options:

    a. Degree of Protection: Type 3R.

F. UL CYIV - Outdoor Sheet Metal Cutout Boxes :

1. General Characteristics: Enclosure that has swinging doors or covers secured directly to and telescoping with walls of enclosure.
2. Options:

    a. Degree of Protection: Type 3R.

2.2 TERMINATION BOXES

A. Description: Enclosure for termination base consisting of lengths of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors or both.

B. Performance Criteria:

1. Regulatory Requirements:

    a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

2. Listing Criteria:

    a. UL CCN XCKT; including UL 1773.
    b. Non-Environmental Characteristics: UL 50.
    c. Environmental Characteristics: UL 50E.

C. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

D. UL XCKT - Termination Boxes and Termination Bases for Installation on Line Side of Service Equipment :

1. Additional Characteristics: Listed and labeled for installation on line side of service equipment.
2. Options:

    a. Indoor Degree of Protection: Type 1.
    b. Outdoor Degree of Protection: Type 3R.

2.3 MISCELLANEOUS ENCLOSURES

A. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

2. Listing Criteria:

a. UL CCN XCKT; including UL 1773.
b. Non-Environmental Characteristics: UL 50.
c. Environmental Characteristics: UL 50E.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.
2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

C. UL XCKT - Indoor Sheet Metal Miscellaneous Enclosures :

1. Options:

a. Degree of Protection: Type 1.

D. UL XCKT - Outdoor Sheet Metal Miscellaneous Enclosures :

1. Options:

a. Degree of Protection: Type 3R.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Shop Drawings: Prepare and submit the following:

1. Shop Drawings for Custom Enclosures and Cabinets: Include plans, elevations, sections, and attachment details.
2. Shop Drawings for Racks or Frames:

a. Include plans, elevations, sections, details, and attachments to other work.
b. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
c. Include workspace requirements and access for cable connections.
d. Grounding: Indicate location of RBB and its mounting detail showing standoff insulators and wall-mounting brackets.

3.3 SELECTION OF ELECTRICAL CABINETS AND ENCLOSURES

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of electrical cabinets and enclosures. Consult Commissioner for resolution of conflicting requirements.

B. Degree of Protection:

1. Outdoors:

a. Type 3R unless otherwise indicated.
b. Locations Exposed to Hosedown: Type 4.
c. Locations Subject to Potential Flooding: Type 6P.
d. Locations Aboveground Where Mechanism Must Operate When Ice Covered: Type 3S.
e. Locations in-Ground or Exposed to Corrosive Agents: Type 4X.
f. Locations in-Ground or Exposed to Corrosive Agents Where Mechanism Must Operate When Ice Covered: Type 3SX.

2. Indoors:

a. Type 1 unless otherwise indicated.
b. Damp or Dusty Locations: Type 12.
c. Locations Exposed to Airborne Dust, Lint, Fibers, or Flyings: Type 4.
d. Locations Exposed to Hosedown: Type 4.
e. Locations Exposed to Brief Submersion: Type 6.
f. Locations Exposed to Prolonged Submersion: Type 6P.
g. Locations Exposed to Corrosive Agents: Type 4X.
h. Locations Exposed to Spraying Oil or Coolants: Type 13.

3.4 INSTALLATION OF ELECTRICAL CABINETS AND ENCLOSURES

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Cabinets and Cutout Boxes: Article 312 of NFPA 70.
2. Consult Commissioner for resolution of conflicting requirements.

C. Special Installation Techniques:

1. Mount cabinets and enclosures at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center top bottom of box unless otherwise indicated.
2. Do not install cabinets, enclosures, or fittings in contact with concrete or earth.
3. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.
4. Identification: Provide labels for cabinets, enclosures, racks and associated electrical equipment.

    a. Identify field-installed conductors, interconnecting wiring, and components.
    b. Provide warning signs.
    c. Label each cabinet, enclosure, and rack with engraved metal or laminated-plastic nameplate.

D. Interfaces with Other Work:

1. Coordinate with Section 078413 "Penetration Firestopping" for installation of sealants.
2. Grounding and Bonding:

    a. Cabinets, Enclosures, and Racks for Electrical Systems: Coordinate with Section 260526 "Grounding and Bonding for Electrical Systems" for grounding of RBBs.
    b. Cabinets, Enclosures, and Racks for Communications Systems and Electronic Safety and Security Systems: Coordinate with Section 260526 "Grounding and Bonding for Electrical Systems" for grounding of RBBs.

3.5 CLEANING

A. Remove construction dust and debris from cabinets, enclosures, and racks.

3.6 PROTECTION

A. Protect coatings and finishes of cabinets, enclosures, and racks from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 262716

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. General-grade single straight-blade receptacles.
2. General-grade duplex straight-blade receptacles.
3. Receptacles with arc-fault and ground-fault protective devices.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260923 "Lighting Control Devices" for occupancy sensors, timers, control-voltage switches, and control-voltage dimmers.

1.3 DEFINITIONS

A. Commercial/Industrial-Use Cord Reel: A cord reel subject to severe use in factories, commercial garages, construction sites, and similar locations requiring a harder service-type cord.

B. UL 1472 Type I Dimmer: Dimmer in which air-gap switch is used to energize preset lighting levels.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. General-grade single straight-blade receptacles.
2. General-grade duplex straight-blade receptacles.
3. Receptacles with arc-fault and ground-fault protective devices.

B. Shop Drawings:

1. Wiring diagrams for duplex straight-blade receptacles with integral switching means.

C. Field Quality-Control reports.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturers' Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Dimmers.
2. Single straight-blade receptacles.
3. Duplex straight-blade receptacles.
4. Receptacles with GFCI device.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 WARRANTY FOR DEVICES

A. Special Manufacturer Warranty: Manufacturer warrants that devices perform in accordance with specified requirements and agrees to provide repair or replacement of devices that fail to perform as specified within warranty period.

1. Warranty Period: Five years from date of Substantial Completion; prorated coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 GENERAL-GRADE SINGLE STRAIGHT-BLADE RECEPTACLES

A. Single Straight-Blade Receptacle :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Leviton Manufacturing Co., Inc.
b. Pass & Seymour; Legrand North America, LLC.
c. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.
d. Or approved equal.

2. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

3. General Characteristics:

a. Reference Standards: UL CCN RTRT and UL 498.

4. Options:

a. Device Color: As indicated on architectural Drawings.
b. Configuration:

1) Heavy-duty, NEMA 6-30R.

5. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

2.2 GENERAL-GRADE DUPLEX STRAIGHT-BLADE RECEPTACLES

A. Duplex Straight-Blade Receptacle :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Leviton Manufacturing Co., Inc.
b. Pass & Seymour; Legrand North America, LLC.
c. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.
d. Or approved equal.

2. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

3. General Characteristics:

a. Reference Standards: UL CCN RTRT and UL 498.

4. Options:

a. Device Color: As indicated on architectural Drawings.
b. Configuration:

1) Heavy-duty, NEMA 5-20R.

5. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

2.3 RECEPTACLES WITH ARC-FAULT AND GROUND-FAULT PROTECTIVE DEVICES

A. General-Grade, Weather-Resistant Duplex Straight-Blade Receptacle with GFCI Device :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Leviton Manufacturing Co., Inc.
b. Pass & Seymour; Legrand North America, LLC.
c. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.
d. Or approved equal.

2. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

3. General Characteristics:

a. Reference Standards: UL CCN KCXS, UL 498, and UL 943.

4. Options:

a. Device Color: As indicated on architectural Drawings.
b. Configuration: Heavy-duty, NEMA 5-20R.

5. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Receptacles:

1. Verify that receptacles to be procured and installed for City of New York-furnished equipment are compatible with mating attachment plugs on equipment.

3.3 INSTALLATION OF SWITCHES

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Consult Commissioner for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

   a. Mark cover or cover plate using hot, stamped, or engraved machine printing with black -filled lettering, and provide durable wire markers or tags inside device box or outlet box.

3.4 INSTALLATION OF STRAIGHT-BLADE RECEPTACLES

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacle to match configuration diagram in NEMA WD 6.
4. Consult Commissioner for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

   a. Mark cover or cover plate using hot, stamped, or engraved machine printing with black -filled lettering, and provide durable wire markers or tags inside device box or outlet box.

D. Interfaces with Other Work:

1. Do not install Type 3 SPD, including surge-protected relocatable taps and power strips, on branch circuit downstream of GFCI device.

3.5 INSTALLATION OF LOCKING RECEPTACLES

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacle to match configuration diagram in NEMA WD 6.
4. Consult Commissioner for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

   a. Mark cover or cover plate using hot, stamped, or engraved machine printing with white -filled lettering, and provide durable wire markers or tags inside device box or outlet box.

3.6 INSTALLATION OF CONNECTORS, CORDS, AND PLUGS

A. Comply with manufacturer's instructions.

3.7 FIELD QUALITY CONTROL OF STRAIGHT-BLADE RECEPTACLES

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Insert and remove test plug to verify that device is securely mounted.
2. Verify polarity of hot and neutral pins.
3. Measure line voltage.
4. Measure percent voltage drop.
5. Measure grounding circuit continuity; impedance must be not greater than 2 ohms.
6. Perform additional installation and maintenance inspections and diagnostic tests in accordance with NECA NEIS 130 and manufacturers' instructions.

C. Nonconforming Work:

1. Device will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Assemble and submit test and inspection reports.

3.8 SYSTEM STARTUP FOR SWITCHES

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks for momentary switches, dimmer switches, and fan-speed controller switches in accordance with manufacturer's instructions.

3.9 ADJUSTING

A. Occupancy Adjustments for Controlled Receptacles: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

B. Cord Reels and Fittings: Adjust spring mechanisms and moving parts of cord reels and fittings to function smoothly, and lubricate as recommended in writing by manufacturer.

3.10 PROTECTION

A. Devices:

1. Schedule and sequence installation to minimize risk of contamination of wires and cables, devices, device boxes, outlet boxes, covers, and cover plates by plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other materials.
2. After installation, protect wires and cables, devices, device boxes, outlet boxes, covers, and cover plates from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by City of New York.

B. Connectors, Cords, and Plugs:

1. After installation, protect connectors, cords, and plugs from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by City of New York.

END OF SECTION 262726

SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600 V ac and less for use in the following:

   a. Panelboards.
   b. Switchboards.
   c. Enclosed switches.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.

   a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
   b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
3. Current-limitation curves for fuses with current-limiting characteristics.
4. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse. Submit in electronic format suitable for use in coordination software and in PDF format.
5. Coordination charts and tables and related data.
6. Fuse sizes for elevator feeders and elevator disconnect switches.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to requirements per DDC General Conditions, include the following:

1. Ambient temperature adjustment information.
2. Current-limitation curves for fuses with current-limiting characteristics.
3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse used on the Project. Submit in electronic format suitable for use in coordination software and in PDF format.
4. Coordination charts and tables and related data.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 FIELD CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bussmann, an Eaton business.
2. Edison; a brand of Bussmann by Eaton.
3. Littelfuse, Inc.
4. Mersen USA.
5. Or approved equal.

B. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, current-limiting, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

1. Type RK-1: 250-V, zero- to 600-A rating, 200 kAIC, time delay.
2. Type L: 600-V, 601- to 6000-A rating, 200 kAIC, time delay.
3. Type T: 250-V, zero- to 1200-A rating, 200 kAIC, time delay.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

E. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 FUSE APPLICATIONS

A. Cartridge Fuses:

1. Service Entrance: Class L, time delay.
2. Feeders: Class RK1, time delay.
3. Motor Branch Circuits: Class RK1, time delay.
4. Large Motor Branch (601-4000 A): Class L, time delay.
5. Provide open-fuse indicator fuses or fuse covers with open fuse indication.

3.4 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

B. Install spare-fuse cabinet(s) in location shown on the Drawings or as indicated in the field by Commissioner.

3.5 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information inside of door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Enclosures.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 DEFINITIONS

A. GFEP: Ground-fault circuit-interrupter for equipment protection.

B. GFLS: Ground-fault circuit-interrupter for life safety.

C. SPDT: Single pole, double throw.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
2. Enclosure types and details for types other than UL 50E, Type 1.
3. Current and voltage ratings.
4. Short-circuit current ratings (interrupting and withstand, as appropriate).

5. Include evidence of qualified electrical testing laboratory listing for series rating of installed devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
7. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Warranty documentation.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that enclosed switches and circuit breakers perform in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within warranty period.

1. Warranty Period: Three years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Source Limitations: Obtain products from single manufacturer.

2.2 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; Schneider Electric USA.
4. Or approved equal.

B. Type HD, Heavy Duty:

1. Single throw.
2. Three pole.
3. 240 V(ac).
4. 1200 A and smaller.
5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses.
6. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.3 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; Schneider Electric USA.
4. Or approved equal.

B. Type HD, Heavy Duty, Three Pole, Single Throw, 240 V(ac), 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.4 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, UL 50E, and UL 50, to comply with environmental conditions at installed location.

B. Enclosure Finish: Enclosure must be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (UL 50E Type 1).

C. Enclosures designated as UL 50E Type 4, 4X stainless steel, 12, or 12K must have dual cover interlock mechanism to prevent unintentional opening of enclosure cover when circuit breaker is ON and to prevent turning circuit breaker ON when enclosure cover is open.

D. UL 50E Type 7/9 enclosures must be furnished with breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Commencement of work will indicate Installer's acceptance of areas and conditions as satisfactory.

3.3 SELECTION OF ENCLOSURES

A. Indoor, Dry and Clean Locations: UL 50E, Type 1.

B. Outdoor Locations: UL 50E, Type 3R.

C. Other Wet or Damp, Indoor Locations: UL 50E, Type 4.

D. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: UL 50E, Type 12.

3.4 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Special Techniques:

1. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
2. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
3. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
4. Install fuses in fusible devices.

3.5 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.6 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections for Switches:

1. Visual and Mechanical Inspection:

a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, grounding, and clearances.
c. Verify that unit is clean.
d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
e. Verify that fuse sizes and types match the Specifications and Drawings.
f. Verify that each fuse has adequate mechanical support and contact integrity.
g. Inspect bolted electrical connections for high resistance using one of the following methods:

1) Use low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels must be in accordance with manufacturer's published data. In absence of manufacturer's published data, use NETA ATS Table 100.12.

h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on Drawings.
i. Verify correct phase barrier installation.
j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of lowest value.
b. Measure contact resistance across each switchblade fuseholder. Drop values may not exceed high level of manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of lowest value.

c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In absence of manufacturer's published data, use Table 100.1 from NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
e. Perform ground fault test in accordance with NETA ATS Section 7.14 "Ground Fault Protection Systems, Low-Voltage."

C. Tests and Inspections for Molded-Case Circuit Breakers:

1. Visual and Mechanical Inspection:

a. Verify that equipment nameplate data are as described in the Specifications and shown on Drawings.
b. Inspect physical and mechanical condition.
c. Inspect anchorage, alignment, grounding, and clearances.
d. Verify that unit is clean.
e. Operate circuit breaker to ensure smooth operation.
f. Inspect bolted electrical connections for high resistance using one of the following methods:

1) Use low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels must be in accordance with manufacturer's published data. In absence of manufacturer's published data, use NETA ATS Table 100.12.

g. Inspect operating mechanism, contacts, and chutes in unsealed units.
h. Perform adjustments for final protective device settings in accordance with coordination study.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of lowest value.
b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In absence of manufacturer's published data, use Table 100.1 from NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
c. Perform contact/pole resistance test. Drop values may not exceed high level of manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of lowest value.

d. Perform insulation resistance tests on control wiring with respect to ground. Applied potential must be 500 V(dc) for 300 V rated cable and 1000 V(dc) for 600 V rated cable. Test duration must be one minute. For units with solid state components, follow manufacturer's recommendation. Insulation resistance values may be no less than 2 M Ohms.

e. Determine the following by primary current injection:

1) Long-time pickup and delay. Pickup values must be as specified. Trip characteristics may not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
2) Short-time pickup and delay. Short-time pickup values must be as specified. Trip characteristics may not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
3) Ground-fault pickup and time delay. Ground-fault pickup values must be as specified. Trip characteristics may not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
4) Instantaneous pickup. Instantaneous pickup values must be as specified and within manufacturer's published tolerances.

f. Test functionality of trip unit by means of primary current injection. Pickup values and trip characteristics must be as specified and within manufacturer's published tolerances.

g. Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data. Minimum pickup voltage of shunt trip and close coils must be as indicated by manufacturer.

h. Verify correct operation of auxiliary features such as trip and pickup indicators; zone interlocking; electrical close and trip operation; trip-free, anti-pump function; and trip unit battery condition. Reset trip logs and indicators. Investigate units that do not function as designed.

i. Verify operation of charging mechanism. Investigate units that do not function as designed.

3. Test and adjust controls, remote monitoring, and safeties.

D. Nonconforming Work:

1. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

E. Collect, assemble, and submit test and inspection reports.

1. Test procedures used.
2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
3. List deficiencies detected, remedial action taken, and observations after remedial action.

4. Engage factory-authorized service representative to support field tests and inspections.

3.7 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

3.8 PROTECTION

A. After installation, protect enclosed switches and circuit breakers from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

3.9 INFRARED SCANNING

A. Infrared Scanning of Enclosed Switches and Breakers: Two months after Substantial Completion, perform infrared scan of joints and connections. Remove covers so joints and connections are accessible to portable scanner. Take visible light photographs at same locations and orientations as infrared scans for documentation to ensure follow-on scans match same conditions for valid comparison.

1. Instruments and Equipment: Use infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
2. Follow-up Infrared Scanning: Perform two follow-up infrared scans of enclosed switches and breakers, one at four months and another at 11 months after Substantial Completion.
3. Instrument: Use infrared-scanning device designed to measure temperature or to detect significant deviations from normal values. Provide documentation of device calibration.
4. Report: Prepare certified report that identifies units checked and that describes scanning results. Include notation of deficiencies detected, remedial actions taken, and scanning observations after remedial action.

END OF SECTION 262816

SECTION 263100 - PHOTOVOLTAIC COLLECTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. PV system description and regulatory application requirements.

1.3 DEFINITIONS

A. ETFE: Ethylene tetrafluoroethylene.

B. FEP: Fluorinated ethylene propylene.

C. IP Code: Required ingress protection to comply with IEC 60529.

D. MPPT: Maximum power point tracking.

E. PTC: PVUSA Test Condition. Commonly regarded as a "real-world" measure of PV output. See below for definition of "PVUSA."

F. PV: Photovoltaic.

G. PVUSA: Photovoltaics for Utility Systems Applications.

H. STC: Standard Test Conditions defined in IEC 61215.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Basis-of-Design Product: Subject to compliance with requirements, provide QCELLS; Q.PEAK DUO XL G10.d 490 or comparable product by one of the following:

1. Mitsubishi Electric Corporation.
2. SunPower Corporation.
3. Or approved equal.

2.2 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Hazardous Locations: FM Global approved for NFPA 70, Class 1, Division 2, Group C and Group D.

2.3 PV CAPACITIES AND CHARACTERISTICS

A. Minimum Electrical Characteristics:

1. Rated Open-Circuit Voltage: 54.06 V dc.
2. Maximum System Voltage: 1500 V dc.
3. Maximum Power at Voltage (Vpm): 45.92V dc.
4. Rated Short-Circuit Current (Isc): 12.26 A.
5. Rated Operation Current (Imp): 11.67 A.
6. Maximum Power at STC (Pmax): 490 Watts.

2.4 PV SYSTEMS DESCRIPTION

A. Interactive PV System: Collectors connected in parallel to the electrical utility; and capable of providing power for Project and supplying power to a distributed network.

1. A 171 -module array to generate a total nominal rated output of 83790 W.
2. System Components:

a. PV modules.
b. Array frame.
c. Utility-interactive inverter.
d. Overcurrent protection, disconnect, and rapid shutdown devices.
e. Mounting structure.
f. Utility meter.

2.5 MANUFACTURED PV UNITS

A. Cell Materials: Monocrystalline.

B. Front Panel: Antireflective coating glass.

C. Junction Box:

1. Fully potted, vandal resistant.
2. IP Code: IP67.
3. Flammability Test: UL 1703.

D. Output Cabling:

1. Quick, multiconnect, polarized connectors.
2. Two-Conductor Harness: No traditional return wire is needed from the end of a row back to the source combiner.

2.6 PV MODULE FRAMING

A. PV laminates mounted in anodized extruded-aluminum frames.

1. Entire assembly UL listed for electrical and fire safety, Class A, according to UL 1703, and complying with IEC 61215.
2. Frame strength exceeding requirements of certifying agencies in subparagraph above.
3. Finish: Anodized aluminum.

a. Alloy and temper recommended by framing manufacturer for strength, corrosion resistance, and application of required finish.
b. Color: As indicated by manufacturer's designations.

4. Finish: High-performance organic finish.

a. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent PVC resin by weight.
b. Color: As indicated by manufacturer's designations.

5. Finish: Baked-enamel finish.

a. Color: As indicated by manufacturer's designations.

2.7 PV ARRAY CONSTRUCTION

A. Framing:

1. Material: Extruded aluminum.
2. Maximum System Weight: Less than 4 lb/sq. ft..
3. Raceway Cover Plates: Aluminum.

B. (RF-01) Flat-Roof Mounting:

1. No roof penetrations.
2. Self-ballasting.
3. Wind-tunnel tested to 110-mph wind.
4. Service Life: 25 years.
5. Freestanding system.

C. (RF-02) Sloped-Roof Mounting
1. Mount with ballast free, non-penetrating equipment attachments (see Section 077200 Roof Accessories).
2. Wind Tunnel tested to 110-mph wind.
3. Service Life: 25 years.

2.8 INVERTER

A. Inverter Type: Central.

B. Control Type: Pulse-width-modulation control.

C. Control Type: Maximum power point tracker control.

D. Inverter Electrical Characteristics:

1. Maximum Recommended PV Input Power: 50kW.
2. Number of Independent MPPT Circuits: 6/2.

E. Operating Conditions:

1. Operating Ambient Temperatures: Minus 0 to plus 140 deg F.
2. Relative Humidity: Zero to 100 percent, noncondensing.

F. Enclosure:

1. NEMA 250, Type 4X.
2. Cooling Methods:

a. Fan convection cooling.

3. Standard LCD, four lines, 20 characters, with user display and on/off toggle switch.

G. Disconnects: Rated for system voltage and conductor.

H. Regulatory Approvals:

1. IEEE 1547.1.
2. IEEE 1547.3.
3. UL 1741.

2.9 MOUNTING STRUCTURES

A. Roof Mount: Extruded aluminum, four rails, tilt legs, and roof standoffs.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 REGULATORY APPROVALS

A. Prior to installation of photovoltaic collector system, prepare, submit, and obtain approval on Coordinated Electric System Interconnection Review (CESIR) application as required based on PV layout and resulting electrical output.

3.3 EXAMINATION

A. Examine substrate areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Do not begin installation until mounting surfaces have been properly prepared.

C. If preparation of mounting surfaces is the responsibility of another installer, notify Commissioner of unsatisfactory preparation before proceeding.

D. Examine modules and array frame before installation. Reject modules and arrays that are wet, moisture damaged, or mold damaged.

E. Examine roofs, supports, and supporting structures for suitable conditions where PV system will be installed.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.4 INSTALLATION

A. Comply with NECA 1.

B. Coordinate layout and installation of PV panels with roof assembly and other construction.

C. Support PV panel assemblies independent of supports for other elements such as roof and support assemblies, enclosures, vents, pipes, and conduits. Support assembly to prevent twisting from eccentric loading.

D. Install PV inverters, rapid shutdown, and system control in locations indicated on Drawings.

E. Install weatherseal fittings and flanges where PV panel assemblies penetrate exterior elements such as walls or roofs. Seal around openings to make weathertight. See Section 079200 "Joint Sealants" for materials and application.

F. Wiring Method: Install cables in raceways.

G. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.5 CONNECTIONS

A. Coordinate PV panel cabling to equipment enclosures to ensure proper connections.

B. Coordinate installation of utility-interactive meter with utility.

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

D. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

END OF SECTION 263100

SECTION 265000 - LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Luminaires.
2. Luminaire fittings.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" specifies additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. specifies wiring connections installed by this Section.
3. Section 260529 "Hangers and Supports for Electrical Systems" specifies channel and angle supports installed by this Section.
4. Section 260923 "Lighting Control Devices" specifies automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors installed by this Section.

1.3 DEFINITIONS

A. BUG Rating: Backlight, uplight, and glare rating for light pollution from exterior luminaires.

B. Correlated Color Temperature (CCT): The absolute temperature (in kelvins) of a blackbody whose chromaticity (color quality) most nearly resembles that of the light source.

C. Color Rendering Index (CRI): The measure of the degree of color shift objects undergo when illuminated by the light source as compared with the color of those same objects when illuminated by a reference light source. The lower the CRI of a light source, the more difficult it is to identify colors and stripes on electronic components and wiring.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For luminaires.

a. Product Listing: Include copy of unexpired approval letter, on letterhead of qualified electrical testing agency, certifying product's compliance with specified listing criteria.

1) If listed manufacturer differs from selling manufacturer, indicate relationship between entities on submittal. Clearly indicate which entity warrants product performance and fitness for purpose.
2) Listing criteria identified in approval letter must match specified listing criteria. Approval of only equipment's enclosure is not considered approval of equipment for intended application.
3) Product identification in approval letter must match product branding and model numbers in submittal. Approval letters for similar products are not acceptable.

b. Product Certificates: Include product certificates stating compliance with standards listed below, signed by manufacturer or fabricator.

1) Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with current accreditation under National Voluntary Laboratory Accreditation Program (NVLAP) for Energy Efficient Lighting Products.
2) Testing Agency Certified Data: For luminaires indicated on Lighting Fixture Schedule on Drawings, photometric data certified by qualified independent testing laboratory. Photometric data for remaining luminaires must be certified by manufacturer.

c. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
d. Include operating characteristics, electrical characteristics, and furnished accessories.
e. Include schedule of submitted lighting products. Arrange schedule and accompanying product data in order by luminaire and lamp designations indicated on Drawings.
f. Include battery and charger data for emergency lighting units.
g. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
h. Include photometric data and adjustment factors obtained from qualified laboratory tests.
i. Include manufacturer's sample warranty language.

2. For luminaire fittings.

a. Product Listing: Include copy of unexpired approval letter, on letterhead of qualified electrical testing agency, certifying product's compliance with specified listing criteria.

1) If listed manufacturer differs from selling manufacturer, indicate relationship between entities on submittal. Clearly indicate which entity warrants product performance and fitness for purpose.
2) Listing criteria identified in approval letter must match specified listing criteria. Approval of only equipment's enclosure is not considered approval of equipment for intended application.

3) Product identification in approval letter must match product branding and model numbers in submittal. Approval letters for similar products are not acceptable.

b. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
c. Include operating characteristics, electrical characteristics, and furnished accessories.
d. Include schedule of submitted lighting products. Arrange schedule and accompanying product data in order by luminaire and lamp designations indicated on Drawings.
e. Include manufacturer's sample warranty language.

3. For electric-discharge lamp control equipment.

a. Product Listing: Include copy of unexpired approval letter, on letterhead of qualified electrical testing agency, certifying product's compliance with specified listing criteria.

1) If listed manufacturer differs from selling manufacturer, indicate relationship between entities on submittal. Clearly indicate which entity warrants product performance and fitness for purpose.
2) Listing criteria identified in approval letter must match specified listing criteria. Approval of only equipment's enclosure is not considered approval of equipment for intended application.
3) Product identification in approval letter must match product branding and model numbers in submittal. Approval letters for similar products are not acceptable.

b. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
c. Include operating characteristics, electrical characteristics, and furnished accessories.
d. Include schedule of submitted lighting products. Arrange schedule and accompanying product data in order by luminaire and lamp designations indicated on Drawings.
e. Include manufacturer's sample warranty language.

4. For lamps.

a. Product Listing: Include copy of unexpired approval letter, on letterhead of qualified electrical testing agency, certifying product's compliance with specified listing criteria.

1) If listed manufacturer differs from selling manufacturer, indicate relationship between entities on submittal. Clearly indicate which entity warrants product performance and fitness for purpose.
2) Listing criteria identified in approval letter must match specified listing criteria. Approval of only equipment's enclosure is not considered approval of equipment for intended application.
3) Product identification in approval letter must match product branding and model numbers in submittal. Approval letters for similar products are not acceptable.

b. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
c. Include operating characteristics, electrical characteristics, and furnished accessories.
d. Include schedule of submitted lighting products. Arrange schedule and accompanying product data in order by luminaire and lamp designations indicated on Drawings.
e. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.

f. Include manufacturer's sample warranty language.

B. Samples:

1. For luminaires.

a. One for each kind of luminaire fitting with specified rating, size, finish, color, and texture.

2. For luminaire fittings.

a. One for each kind of luminaire fitting with specified rating, size, finish, color, and texture.

3. For lamps.

a. One for each kind of lamp with specified rating, size, base, and color.

C. Shop drawings.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturers' published instructions.

B. Field Reports:

1. Manufacturer's field reports for field quality-control support.
2. Manufacturer's field reports for system startup support.

1.7 CLOSEOUT SUBMITTALS

A. Warranty documentation.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 01400 "Quality Requirements."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect exposed surface finishes on lighting equipment by applying strippable, temporary protective covering before shipping.

1.10 WARRANTY FOR LUMINAIRES

A. Warranty for Luminaires: Manufacturer warrants that luminaires perform in accordance with specified requirements and agrees to provide components and materials for repair or replacement of products that fail to perform as specified within warranty period.

1. Warranty Period: 10 years from date of Substantial Completion for L01 fixtures. 5 years from date of Substantial Completion for balance of fixtures.

1.11 WARRANTY FOR BATTERIES

A. Warranty for Batteries: Manufacturer warrants that batteries perform in accordance with specified requirements and agrees to provide materials for repair or replacement of batteries that fail to perform as specified within warranty period.

1. Warranty Period for Li-ion Batteries: Five years from date of Substantial Completion; full coverage for materials only.
2. Warranty Period for Ni-Cd Batteries:Five years from date of Substantial Completion; full coverage for materials only.

PART 2 - PRODUCTS

2.1 LUMINAIRES

A. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.
b. See individual product types below for listing criteria.
c. Marked in accordance with UL CCN HYXT, including UL 1598, for compatible power supply, installation location, and environmental conditions.

B. Source Quality Control:

1. Compile and submit product data.
2. Compile and submit sustainable design product data.
3. Compile and submit samples.

C. Surface-Mounted Luminaire

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. H.E. Williams.
b. RAB Lighting.
c. Selux Corporation.
d. Visa Lighting.
e. Lumenwerx.
f. Finelite
g. Kelvix
h. Q-Tran
i. Bartco
j. Axis
k. A Light
l. DMF Lighting
m. Extant

n. Vode
o. Luminis
p. Lucifer
q. Zaniboni
r. SPI
s. ALW
t. Kelvix
u. Pinnacle
v. Lumentruss
w. Luminii
x. Coronet
y. WAC
z. Sistemalux
aa. Artemide
bb. Visual Comfort co.
cc. Lucetta
dd. Or approved equal.

2. Source Limitations: Obtain products for this luminaire type from single manufacturer. Bin LEDs for this luminaire type within three-step MacAdam Ellipse to ensure consistent chromaticity for all luminaires of this type.
3. Product Description: see fixture types and (3) name specifications below.

a. L01: Subject to compliance with requirements, provide one of the following:

1) Finelite: HP-2 pendant
2) Selux: M36 LED direct/indirect pendant
3) Lumenwerx: Via 2 pendant

b. L02: Subject to compliance with requirements, provide one of the following:

1) Visa Lighting: CP7122 Zume DL
2) SPI Lighting: Vallejo pendant
3) ALW: CP system suspended
4) Or approved equal.

c. L03/L03A: Subject to compliance with requirements, provide one of the following:

1) Extant: HTGDU-1W wall
2) Vode: Zip three wall mount
3) Bartco: BSS722 wall mount

d. L04: Subject to compliance with requirements, provide one of the following:

1) DMF: DCC LED cylinder pendant
2) Luminii Senso: Leto 11 UD adjustable
3) Lumenwerx: Aera 3" inflex cylinder pendant direct/indirect
4) Or approved equal.

e. L05: Subject to compliance with requirements, provide one of the following:

1) Kelvix: Signwave 3
2) Q-Tran: Q-cap kurv static white
3) Lucetta: Encapsulated linear LED
4) Or approved equal.

f. L06: Subject to compliance with requirements, provide one of the following:

1) Luminis: SN1100/SN1100C
2) Selux: KJU circle
3) Lumenwerx: Shell round surface
4) Or approved equal.

g. L07: Subject to compliance with requirements, provide one of the following:

1) Visual comfort co.: Entra 3"
2) Lucifer: Fraxion 3 slim
3) Lumenwerx: Aera 3" downlight
4) Or approved equal.

h. L08/L08A: Subject to compliance with requirements, provide one of the following:

1) Lumenwerx: Walo LED
2) Artemide: LineaCurve wall/ceiling
3) Sistemalux: Linear EVO
4) Or approved equal.

i. L09/L09A: Subject to compliance with requirements, provide one of the following:

1) Pinnacle: Edge EX3BWET
2) Lumenwerx: Via 4 seal direct/indirect
3) Selux: M36 direct/indirect
4) Or approved equal.

j. L10: Subject to compliance with requirements, provide one of the following:

1) Q-tran: Kicker flat static white
2) Lumentruss: 4250 Profile series
3) Luminii: LineLED LL series
4) Or approved equal.

k. L11T/L11: Subject to compliance with requirements, provide one of the following:

1) Lumenwerx: Pivot track series
2) Coronet: Magneto
3) WAC: H Track / Silo
4) Or approved equal.

l. L12: Subject to compliance with requirements, provide one of the following:

1) Lumenwerx: Via 3 perimeter

2) Finelite: HP-WS perimeter slot
3) Axis: Beam3 LED perimeter recess
4) Or approved equal.

m. L13/L13A: Subject to compliance with requirements, provide one of the following:

1) HE Williams: LLM LED slimline
2) Lumenwerx: Quad narrow pendant
3) Coronet: LS1 square direct
4) Or approved equal.

n. EX01: Sole Source Product: Sentry SLR Riverside Exterior Light Fixture

1) No substitutions permitted.

o. EX03: Subject to compliance with requirements, provide one of the following:

1) Visa Lighting: OW2480 passage
2) Lumenwerx: Via 2 seal direct
3) A light: ALD2ST
4) Or approved equal.

p. EX04: Subject to compliance with requirements, provide one of the following:

1) RAB: Slim17FA15ADJ
2) Cooper lighting: Lumark AP ASWP adjustable slim wall pack
3) Lithonia: WDGE1 LED

q. EX05: Subject to compliance with requirements, provide one of the following:

1) Visual comfort co.: Entra 3" LED
2) Zaniboni: Stella 3 Q
3) Lumenwerx: Aera 3" downlight
4) Or approved equal.
5)

4. Product Listing Criteria, LED: UL CCN IFAM; including UL 1598.
5. Product Characteristics:

a. Openings: Doors, frames, and access panels must operate smoothly, not leak light under operating conditions, and permit relamping without use of tools or parts falling from enclosure.
b. Nominal Operating Voltage: As specified per Commissioner .
c. Nominal Luminaire Operating Power Rating: Power wattages vary per fixture type. To meet power rating as described per fixture type in manufacturer's specification.
d. CRI: 80+ CRI in back of house spaces, 90+ CRI in regularly occupied spaces.
e. Driver Location: Internal or Remote as specified per fixture type.
f. Materials:

1) Enclosure: ASTM B209/B209M extruded-aluminum ASTM A568/A568M sheet steel housing and heat sink; free of sharp edges and burrs.
2) Enclosure Ingress Protection Rating: Rating per individual fixture type detailed in manufacturer product cutsheet. To vary per fixture type.

3) Lenses, Diffusers, and Globes:

a) Fixed and/or adjustable lens where applicable.
b) Spot, medium, wide beamspread light distribution as specified.
c) Tempered Fresnel annealed crystal class, prismatic annealed crystal glass, diffused annealed crystal glass, clear annealed crystal glass, prismatic acrylic, or clear, heat - and UV-stabilized virgin acrylic plastic.
d) Lens Thickness: Not less than 0.125 inch unless otherwise indicated.

4) Visible variations in metal finishes outside range of approved samples are unacceptable in adjoining components.

g. LED Luminaires (UL CCN IFAM):

1) Output Intensity: Output lumens as described per fixture type in manufacturer's specification information.
2) Rated Life: 50 000 hours to L70.
3) CCT: 3000 K.

6. Required Product Options:

a. Mounting Hardware: Ceiling-mounted, , Wall-mounted, and Building-mounted; See drawings.
b. Mounting Height: per Architectural elevation drawings and details. As shown on drawings.
c. Visible variations in metal finishes outside range of approved samples are unacceptable in adjoining components.
d. Dimmable from 100 percent to zero percent of maximum light output.
e. Stainless steel latches.
f. Integral pressure equalizer.

7. Installation Markings:

a. LED Luminaires (UL CCN IFAM):

1) "SUITABLE FOR OPERATION IN AMBIENTS NOT EXCEEDING MANUFACTUER APPROVED ℃/F."
2) "PUSH CONDUCTORS INTO JUNCTION BOX."
3) "WALL MOUNT ONLY."
4) "NONCOMBUSTIBLE SURFACE ONLY."
5) "SUITABLE FOR UNDER-CABINET MOUNT."
6) "SUITABLE FOR CONTINUOUS ROW MOUNTING."
7) "THIS LUMINAIRE MUST BE MOUNTED OR SUPPORTED INDEPENDENTLY OF AN OUTLET BOX."

D. Recessed Luminaire :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Visual Comfort Co.
b. Lumenwerx
c. DMF
d. Q-tran

e. Lumentruss
f. Luminii
g. USAI
h. Zaniboni
i. Or approved equal.

2. Source Limitations: Obtain products for this luminaire type from single manufacturer. Bin LEDs for this luminaire type wihtin three-step MacAdam Ellipse to ensure consistent chromaticity for all luminaires of this type.
3. Product Description: see fixture schedule and types as listed per manufacturer specifications below.
4. Product Characteristics:

a. Ceiling Compatibility: NEMA LE 4.
b. Openings: Doors, frames, and access panels must operate smoothly, not leak light under operating conditions, and permit relamping without use of tools or parts falling from enclosure.
c. Nominal Luminaire Operating Power Rating: As defined per fixture type in lighting fixture schedule or manufacturer's product information.
d. CRI: 90+.
e. Ballast or Driver Location: Internal.
f. Materials:

1) Enclosure: ASTM B209/B209M extruded-aluminum ASTM A568/A568M sheet steel housing and heat sink; free of sharp edges and burrs.
2) Enclosure Ingress Protection Rating: Rating per individual fixture type detailed in manufacturer product cutsheet. To vary per fixture type.
3) Lenses, Diffusers, and Globes:

a) Fixed, or adjustable lens as specified.
b) Spot, Medium, or Wide beamspread light distribution as specified.
c) Tempered Fresnel annealed crystal class, prismatic annealed crystal glass, diffused annealed crystal glass, clear annealed crystal glass, prismatic acrylic, or clear, heat - and UV-stabilized virgin acrylic plastic.
d) Lens Thickness: Not less than 0.125 inch unless otherwise indicated.

4) Visible variations in metal finishes outside range of approved Samples are unacceptable in adjoining components.

g. LED Luminaires (UL CCN IFAO):

1) Output Intensity: Not less than lumens as specified per fixture type, lumens as outlined in light fixture schedule or manufacturer light fixture cutsheet, to vary per fixture type.
2) Rated Life: 50 000 hours to L70.
3) CCT: 3000 K.

5. Required Product Options:

a. Mounting Hardware: Ceiling-mounted and wall mounted fixtures; include universal mounting bracket and integral junction box with conduit fittings.

b. Dimmable from 100 percent to zero percent of maximum light output.
c. Stainless-steel latches.

d. Integral pressure equalizer.

6. Installation Markings:

a. LED Luminaires (UL CCN IFAO):

1) "TYPE IC LUMINAIRE."
2) "TYPE NON-IC LUMINAIRE."
3) "INHERENTLY PROTECTED LUMINAIRE."
4) "INSTALL IN BUILDINGS OF FIRE-RESISTANT CONSTRUCTION."
5) "INSTALL WITH MINIMUM SPACINGS BETWEEN A) CENTER-TO-CENTER OF ADJACENT LUMINAIRES: PER ARCHITECTURAL DETAILS AND DRAWINGS INDICATE IN INCHES; B) TOP OF LUMINAIRE AND AN OVERHEAD BUILDING MEMBER: INSTALLED AS DRAWN PER ARCHITECTURAL DETAILS IN INCHES; AND C) LUMINAIRE CENTER-TO-SIDE OF BUILDING MEMBER: PER ARCHITECTURAL DETAILS AND DRAWINGS IN INCHES."
6) "FOR USE IN CONCRETE ONLY."
7) "SUITABLE FOR USE IN POURED CONCRETE."
8) "SUITABLE FOR SUSPENDED CEILING."
9) "SUITABLE FOR GROUND-MOUNTED RECESSED ONLY."
10) "SUITABLE FOR GROUND-MOUNTED RECESSED."
11) "BLINKING LIGHT OF THIS THERMALLY PROTECTED LUMINAIRE MAY INDICATE OVERHEATING."
12) "MAXIMUM OF MANUFACTURER APPROVED AWG BRANCH CIRCUIT CONDUCTOR SUITABLE FOR MANUFACUTER APPROVED TEMPERATURE IN DEGREES℃ PERMITTED IN BOX."
13) "ACCESS ABOVE CEILING REQUIRED."
14) "ACCESS BEHIND WALL REQUIRED."
15) "FOR USE IN NON-FIRE-RATED INSTALLATIONS."
16) PROVIDE CORRELATING MARKINGS IDENTIFYING MATCHING HOUSING, TRIM, ROUGH-IN SECTION, AND FINISHING SECTION.

E. UL FTBR or FTBV - Emergency Lighting and Power Equipment :

1. Source Limitations: Obtain products from single manufacturer.
2. Product Listing Criteria: UL CCN FTBR or UL CCN FTBV; including UL 924, NFPA 101, and ICC IBC.
3. Product Characteristics:

a. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
b. Status and Test Indication: Visible and accessible without opening luminaire or entering ceiling space.

1) Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
2) Test Push-Button: Push-to-test button in unit housing simulates loss of normal power and demonstrates unit operability.

4. Required Product Options:

a. Mounting Height: As shown on drawings, and to comply with all applicable codes.

b. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.
c. External Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, suitable for powering one or more lamps, remote mounted from luminaire.

1) Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
2) Emergency Connection: Operate required number of LED lamps continuously. Connect unswitched circuit to battery inverter unit and switch circuit to luminaire.
3) Battery Type: Ni-Cd or Li-ion per Commissioner.
4) Charger: Fully automatic, solid-state, constant-current type.
5) Test Push-Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
6) LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
7) Remote Test: Switch in handheld remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
8) Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

F. UL FWBO - Exit Fixture :

1. Source Limitations: Obtain products from single manufacturer.
2. Product Listing Criteria: UL CCN FWBO; including UL 924, NFPA 101, NFPA 5000, and 2022 NYC BC.
3. Product Characteristics:

a. Illumination Style: Edge Lit.
b. Light Source: LED; 50,000 hours minimum rated life.
c. Legend Color: Red or Green.
d. Battery Type: Ni-Cd or Li-ion.

4. Required Product Options:

a. Mounting Height: As shown on drawings.

G. UL FWBX - Self-Luminous or Photoluminescent Exit Sign :

1. Source Limitations: Obtain products from single manufacturer.
2. Product Listing Criteria: UL CCN FWBX; including UL 924, NFPA 101, NFPA 5000, and 2022 NYC BC.
3. Product Characteristics:

a. Illumination Style: Edge Lit.

2.2 LUMINAIRE FITTINGS

A. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory, and marked for intended location and application.
b. See individual product types below for listing criteria.

B. Source Quality Control:

1. Compile and submit product data.
2. Compile and submit sustainable design product data.
3. Compile and submit samples.

C. Luminaire Support Accessories:

1. Product Characteristics:

a. Sized and rated for luminaire weight.
b. Capable of maintaining luminaire position after cleaning and relamping.
c. Capable of supporting luminaire without causing deflection of ceiling or wall.
d. Capable of supporting horizontal force equal to 100 percent of luminaire weight and vertical force equal to 400 percent of luminaire weight.
e. Sloped ceiling conditions, where applicable, to keep light fixture oriented correctly.

2. Required Product Options:

a. Aircraft Cables: 5/32 inch diameter aircraft cable supports adjustable to 10 ft in length.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Shop Drawings: Prepare and submit the following:

1. Drawings, Diagrams, and Supporting Documents for Custom Luminaires:

a. Include plans, elevations, sections, and mounting and attachment details.
b. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
c. Include diagrams for power, signal, and control wiring.

B. Temporary Lighting: If approved by Commissioner, specified luminaires for Project may be installed for temporary lighting. Install and energize minimum quantity of luminaires necessary to meet needs of construction activities. When construction is sufficiently complete, remove, disassemble, clean, and relamp luminaires used for temporary lighting before reinstalling for Project delivery.

3.4 INSTALLATION OF LIGHTING

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Installation of Indoor Lighting Systems: NECA NEIS 500.
2. Installation of Exterior Lighting Systems: NECA NEIS 501.
3. Installation of Industrial Lighting Systems: NECA NEIS 502.
4. Installation of Luminaires, Lampholders, and Lamps: Article 410 of NFPA 70.
5. Installation of Extra-Low-Voltage Lighting: Article 411 of NFPA 70.
6. Installation of Lighting for Sensitive Electronic Equipment: Article 647 of NFPA 70.
7. Installation of Emergency Lighting and Exit Signs: ICC IBC, NFPA 101, and Parts IV and V in Article 700 of NFPA 70.

C. Special Installation Techniques:

1. Install luminaires at height and aiming angle as indicated on Drawings.
2. Coordinate layout and installation of luminaires with other construction.
3. Adjust luminaires that require field adjustment or aiming.

4. Flush-Mounted Luminaire Support:

a. Secured to outlet box.
b. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
c. Trim ring flush with finished surface.

5. Wall-Mounted Luminaire Support:

a. Attached to structural members in walls, or Attached to a minimum 1/8 inch backing plate attached to wall structural members, or Attached using through bolts and backing plates on either side of wall per manufacturer recommendations.
b. Do not attach luminaires directly to gypsum board.

6. Suspended Luminaire Support:

a. Ceiling Mount:

1) Hook hangers.
2) Provide manufacturer recommended quantity of wires.
3) Provide manufacturer recommended quantity per lengths of aircraft cables.

b. Pendants and Rods: Where longer than 48 inch, brace to limit swinging.
c. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
d. Continuous Rows of Luminaires: Provide tubing or stem for wiring at one point andtubing or wire support for suspension for each unit length of luminaire chassis, including one at each end.
e. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

7. Ceiling-Grid-Mounted Luminaire Support:

a. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each luminaire. Locate not more than 6 inch from luminaire corners.
b. Support Clips: Fasten to luminaires and to ceiling grid members at or near each luminaire corner with clips that are UL listed for application.
c. Luminaires of Sizes Smaller Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support luminaires independently with no fewer than two 3/4 inch metal channels spanning and secured to ceiling tees.
d. Seismic Restraint: Install at least one independent support rod or wire from structure to tab on luminaire. Wire or rod must have breaking strength for luminaire weight with safety factor of 3.

8. Remote Mounting of Power supplies/drivers/Ballasts: Do not exceed distance between ballast and luminaire recommended by luminaire/power supply/ballast manufacturer.
9. Install wiring connections for luminaires.

D. Systems Integration: Integrate lighting control devices and equipment with electrical power connections for operation of luminaires as specified.

3.5 FIELD QUALITY CONTROL OF LIGHTING

A. Acceptance Testing Preparation:

B. Field tests and inspections must be witnessed by Commissioner.

C. Tests and Inspections:

1. Perform manufacturer's recommended tests and inspections.

2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
3. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
4. Verify operation of photoelectric controls.
5. Exterior Illumination Tests:

    a. Measure light intensities at night. Use photometers with calibration referenced to NIST standards.

D. Nonconforming Work:

1. Luminaire will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

E. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports.

F. Manufacturer Services: Engage factory-authorized service representative tosupport and / or supervise field tests and inspections.

1. Manufacturer's Field Reports for Field Quality-Control Support: Prepare and submit report after each visit by factory-authorized service representative, documenting activities performed at Project site.

3.6 SYSTEM STARTUP

A. Perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's published instructions.
2. Burn-in lamps that require specific aging period to operate properly, prior to occupancy by City of New York.
3. Charge emergency power units and batteries minimum of one hour and depress switch to conduct short-duration test.
4. Charge emergency power units and batteries minimum of 24 hours and conduct one-hour discharge test.

B. Manufacturer Services: Engage factory-authorized service representative to support and/or supervise system startup.

1. Manufacturer's Field Reports for System Startup Support: Prepare and submit report after each visit by factory-authorized service representative, documenting activities performed at Project site.

3.7 ADJUSTING

A. Luminaire Aiming Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aiming direction of luminaires to suit occupied conditions. Make up to 2 visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
2. Parts and supplies must be manufacturer's authorized replacement parts and supplies.

3. Adjust aim of luminaires in presence of Commissioner.

3.8 PROTECTION

A. After installation, protect lighting equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by City of New York.

END OF SECTION 265000

SECTION 265613 - LIGHTING POLES AND STANDARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Steel poles.
2. Cast-iron poles.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 DEFINITIONS

A. EPA: Equivalent projected area.

B. Pole: Luminaire-supporting structure, including tower used for large-area illumination.

C. Standard: See "Pole."

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Steel poles.
2. Cast-iron poles.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting and attachment details.

2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Detail fabrication and assembly of poles and pole accessories .
4. Foundation construction details, including material descriptions, dimensions, anchor bolts, support devices, and calculations, signed and sealed by a professional engineer licensed in the state of New York.
5. Anchor bolt templates keyed to specific poles and certified by manufacturer.
6. Method and procedure of pole installation. Include manufacturer's written installations.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturers' published instructions.

B. Field Reports:

1. Manufacturer's field reports for field quality-control support.

1.7 CLOSEOUT SUBMITTALS

A. Warranty documentation.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Special Tools: Furnish to City of New York equipment and keys required to operate, maintain, repair, adjust, or implement future changes to poles, that are packaged with protective covering for storage on-site and identified with labels describing contents.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.10 DELIVERY, STORAGE, AND HANDLING

A. Package aluminum poles for shipping in accordance with ASTM B660.

B. Store poles on decay-resistant skids at least 12 inch above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.

C. Handle wood poles so they will not be damaged. Do not use pointed tools that can indent pole surface more than 1/4 inch deep. Do not apply tools to section of pole installed below finished grade.

D. Retain factory-applied pole wrappings on fiberglass and laminated wood poles until right before pole installation. Handle poles with web fabric straps.

E. Retain factory-applied pole wrappings on metal poles until right before pole installation. Handle poles with web fabric straps.

1.11 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that poles and luminaire lowers devices perform in accordance with specified requirements and agrees to provide repair or replacement of products that fail to perform as specified within warranty period, including materials that corrode, fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs from special warranty period.

1. Warranty Period: Five years from date of Substantial Completion; full prorated coverage for labor, materials, and equipment.
2. Warranty Period for Corrosion Resistance: Five years from date of Substantial Completion; full, prorated coverage for labor, materials, and equipment.
3. Warranty Period for Color Retention: Five years from date of Substantial Completion; full, prorated coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Characteristics: Comply with AASHTO LTS-6-M.

B. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied in accordance with AASHTO LTS-6-M.

C. Live Load: Single load of 500 lb distributed in accordance with AASHTO LTS-6-M.

D. Ice Load: Load of 3 lb/ft2, applied in accordance with AASHTO LTS-6-M for applicable areas on the Ice Load Map.

E. Wind Load for Poles Not Exceeding 50 ft Height:

1. Basic Wind Speed: to withstand designated miles/h (100 or 90) as required for project location.
2. Wind Importance Factor: 1.0.
3. Minimum Design Life: 25 years.
4. Velocity Conversion Factor: 1.0.

F. Strength Analysis: For each pole, multiply the actual EPA of luminaires and brackets by a factor of 1.1 to obtain the EPA used in pole selection strength analysis.

G. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless steel fasteners and mounting bolts unless otherwise indicated.

H. General Finish Requirements:

1. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.2 STEEL POLES

A. Product: Subject to compliance with requirements, provide one of the following:

1. EX01: Sole Source Product:

   a. Sentry: SLR Riverside Exterior Light Pole
   b. No substitutions permitted.

2. EX03: Subject to compliance with requirements, provide one of the following:

   a. Visa Lighting: OW2480 passage
   b. Lumenwerx: Via 2 seal direct
   c. A light: ALD2ST
   d. Or approved equal.

3. EX04: Subject to compliance with requirements, provide one of the following:

   a. RAB: Slim17FA15ADJ
   b. Cooper lighting: Lumark AP ASWP adjustable slim wall pack
   c. Lithonia: WDGE1 LED
   d. Or approved equal.

4. EX05: Subject to compliance with requirements, provide one of the following:

   a. Visual comfort co.: Entra 3" LED
   b. Zaniboni: Stella 3 Q
   c. Lumenwerx: Aera 3" downlight
   d. Or approved equal.

2.3 SOURCE QUALITY CONTROL

A. Product Data: Prepare and submit catalog cuts, brochures, diagrams, schedules, and performance data illustrating size, physical appearance, and other characteristics of product.

1. Include data on construction details, profiles, EPA, cable entrances, materials, dimensions, weight, rated design load, and ultimate strength of individual components.
2. Include finishes for lighting poles and luminaire-supporting devices.
3. Anchor bolts.
4. Manufactured pole foundations.
5. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements in accordance with AASHTO LTS-6-M and that load imposed by luminaire and attachments has been included in design. The certification must be based on design calculations signed and sealed by a professional engineer licensed in the State of New York.
6. Include sample warranty language.

B. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine poles, luminaire-mounting devices, lowering devices, and pole accessories before installation. Components that are scratched, dented, marred, wet, moisture damaged, or visibly damaged are considered defective.

C. Examine roughing-in for foundation and conduit to verify actual locations of installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 POLE FOUNDATION

A. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Structural steel complying with ASTM A36/A36M and hot-dip galvanized in accordance with ASTM A123/A123M; and with top-plate and mounting bolts to match pole-base flange and strength required to support pole, luminaire, and accessories. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

B. Pre-Cast Foundations: Factory fabricated, with structural steel complying with ASTM A36/A36M and hot-dip galvanized in accordance with ASTM A123/A123M; and with top-plate and mounting bolts to match pole-base flange and strength required to support pole, luminaire, and accessories. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

C. Power-Installed Screw Foundations: Factory fabricated by pole manufacturer, with structural steel complying with ASTM A36/A36M and hot-dip galvanized in accordance with ASTM A123/A123M; and with top-plate and mounting bolts to match pole-base flange and strength required to support pole, luminaire, and accessories.

1. Baseplate: Stamped with manufacturer's name, date of production, and cable entry.

D. Direct-Buried Foundations: Install to depth indicated on Drawings, but not less than onesixth of the pole height as indicated. Add backfill in 6 inch to 9 inch layers, tamping each layer before adding the next as shown on drawings. To ensure a plumb installation, continuously check pole orientation with plumb bob while tamping.

E. Direct-Buried Poles with Concrete Backfill: Set poles in augered holes to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height as indicated . To ensure a plumb installation, continuously check pole orientation with plumb bob while tamping.

1. Make holes 6 inch in diameter larger than pole diameter.
2. Fill augered hole around pole with air-entrained concrete having a minimum compressive strength of 3000 psi at 28 days and finish in a dome above finished grade.
3. Use a short piece of 1/2 inch diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
4. Cure concrete a minimum of 72 hours before performing work on pole.

F. Anchor Bolts: Install plumb using manufacturer-supplied steel or plywood template, uniformly spaced.

3.4 POLE INSTALLATION

A. Alignment: Align poles as indicated, align pole foundations and poles for optimum directional alirnment of luminaires and their mounting provisions on pole.

B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on drawing.

1. Fire Hydrants and Water Piping: 60 inch.
2. Water, Gas, Electric, Communications, and Sewer Lines: 10 ft.
3. Trees: 15 ft from tree trunk.

C. Foundation-Mounted Poles: Mount pole with leveling nuts and tighten top nuts to torque level in accordance with pole manufacturer's written instructions.

1. Use anchor bolts and nuts selected to resist seismic forces specified for the application and approved by manufacturer.
2. Grout void between pole base and foundation. Use nonshrink or expanding concrete grout firmly packed to fill space.
3. Install base covers unless otherwise indicated.
4. Use a short piece of 1/2 inch diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.

D. Poles and Pole Foundations Set in Concrete-Paved Areas: Install poles with a minimum 6 inch wide, unpaved gap between the pole or pole foundation and the edge of the adjacent concrete slab. Fill unpaved ring with pea gravel. Insert material to a level 1 inch below top of concrete slab.

E. Raise and set pole using web fabric slings (not chain or cable) at locations indicated by manufacturer.

3.5 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum using insulating fittings or treatment.

B. Steel Conduits: Comply with requirements in Section 260533.13 "Conduits for Electrical Systems." In concrete foundations, wrap conduit with 0.010 inch thick, pipe-wrapping plastic tape applied with a 50-percent overlap.

3.6 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.7 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Inspect poles for nicks, mars, dents, scratches, and other damage.
2. System function tests.
3. Nonconforming Work:

4. Unit will be considered defective if it does not pass tests and inspections.
5. Remove and replace defective units and retest.

C. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports.

D. Manufacturer Services: Engage factory-authorized service representative to support and/or supervise field tests and inspections.

1. Manufacturer's Field Reports for Field Quality-Control Support: Prepare and submit report after each visit by factory-authorized service representative, documenting activities performed at Project site.

END OF SECTION 265613

SECTION 270010 - SUPPLEMENTAL REQUIREMENTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Supplemental requirements generally applicable to the Work specified in Division 27.

B. Related Requirements:

1. DDC General Conditions Section 013100 "Project Management and Coordination" for preinstallation conference procedures.
2. Work specified in the following Division 26 sections are related to Work specified in Division 27:

   a. Section 260010 "Supplemental Requirements for Electrical" for abbreviations and acronyms for electrical terms and units of measure, abbreviations and acronyms for electrical raceway types, abbreviations and acronyms for electrical cable types, definitions, and additional coordination drawing submittal requirements.

1.3 REFERENCES

A. Abbreviations and Acronyms for Communications:

1. LAN: Local area network.
2. PoE: Power over Ethernet.
3. POTS: Plain old telephone service. See "public switched telephone network."
4. TCP/IP: Transmission control protocol/Internet protocol.
5. WAN: Wide area network.

B. Definitions for Communications:

1. Public Switched Telephone Network (PSTN): Analog telephone technology that uses twisted-pair cables from a telephone-provider central office for the transmission medium. PSTN refers to the telephone network; POTS refers to the individual subscriber line.
2. Remote Office Phone System (ROPS): VoIP system that allows phones for a business or organization located anywhere in the world with internet connectivity to behave similar to phones connected to a PBX.
3. Voice over Internet Protocol (VoIP): Digital telephone packet technology that uses the internet for its transmission medium.

1.4 PREINSTALLATION MEETINGS

A. Communications Preconstruction Conference: Schedule conference with The Commissioner not later than 10 days after notice to proceed. Agenda topics include, but are not limited to, the following:

1. Installation schedule for communications systems.
2. Utility services work coordination and monitoring service requests.
3. Communications Commissioning activities.
4. Sustainability activities.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Coordination Drawings: Submit multidiscipline coordination drawings depicting communications equipment, devices, cabling, conduit, and duct banks in accordance with requirements specified in Section 260010 "Supplemental Requirements for Electrical."

1.7 INFORMATIONAL SUBMITTALS

A. Installation schedule for communications systems.

B. Qualification statements.

1.8 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Qualifications: Prepare and submit qualification statements for the following entities performing Work on Project:

1. Qualified Regional Manufacturer: Manufacturer, possessing qualifications specified in DDC General Conditions Section 014000 "Quality Requirements," that maintains a service center capable of providing instruction, parts, and emergency on-site repairs to Project site with response time less than eight hours.
2. Communications Cable Installer: Entity possessing active qualifications specified in DDC General Conditions Section 014000 "Quality Requirements" and the following:

   a. Instruction and manufacturer certification to install, splice, and terminate communications cabling.
   b. Installation Supervisor: BICSI Technician (TECH) certification.

3. Communications Cable Testing Agency: Entity possessing active credentials from a qualified electrical testing laboratory.

C. Certifications:

1. Seismic-Load Performance Certificates: Include special certification as indicated in Paragraph 13.2.2 "Special Certification Requirements for Designated Seismic Systems" of ASCE/SEI 7-05, for designated seismic-load systems identified on Contract Documents.

a. Submit evidence demonstrating compliance with these requirements for review and acceptance by qualified structural professional engineer licensed in the State of New York.
b. The following systems and components are designated seismic-load systems requiring special certification of seismic qualification by manufacturer:

1) Pathway racks, enclosures, cabinets, equipment racks, and their mounting provisions specified in Section 270528 "Pathways for Communications System."
2) Equipment room fittings specified in Section 271100 "Communications Equipment Room Fittings."

1.10 FIELD CONDITIONS

A. Modeling, analysis, product selection, installation, and quality control for Work specified in Division 27 must comply with requirements specified in Section 260010 "Supplemental Requirements for Electrical."

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Installation Schedule for Communications Systems: At preconstruction meeting, and periodically thereafter as dates change, provide schedule for installation of communications Work to Commissioner including, but not limited to, milestone dates for the following activities:

1. Submission of specified coordination drawings.
2. Submission of action submittals specified in Division 27.
3. Orders placed for major equipment.
4. Arrival of major equipment on-site.
5. Preinstallation meetings specified in Division 27.
6. System startup, testing, and communication equipment commissioning activities.
7. System startup, testing, and commissioning activities for Work specified in other divisions that depends on Work specified in Division 27.

3.3 INSTALLATION OF COMMUNICATIONS WORK

A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' instructions, comply with NFPA 70, NECA NEIS 1, and BICSI N1 for installation of Work specified in Division 27. Consult Commissioner for resolution of conflicting requirements.

3.4 FIELD QUALITY CONTROL

A. Administrant for Communications Tests and Inspections:

1. Engage qualified communications cable testing and inspecting agency to administer and perform tests and inspections.
2. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
3. Administer and perform tests and inspections.

B. Administrant for Structural Tests and Inspections:

1. City of New York will engage a special inspector to administer and perform tests and inspections.

3.5 CLOSEOUT ACTIVITIES

A. Development of Facility EPM Program: Include operation and maintenance data for communications systems in NFPA 70B Facility EPM Program analysis and documentation specified in Section 260010 "Supplemental Requirements for Electrical."

B. Operation and Maintenance Data: Prepare and submit the following:

1. Include the following information:

a. Schedule of maintenance material items recommended to be stored at Project site.

END OF SECTION 270010

SECTION 270528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Type OFR and Type CR communications raceways and fittings.
2. Cable supports and positioning devices.

B. Related Requirements:

1. Section 270010 "Supplemental Requirements for Communications" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 078413 "Penetration Firestopping" specifies firestopping for communications pathways installed by this Section.
3. Section 260526 "Grounding and Bonding for Electrical Systems" specifies grounding and bonding conductors and connectors for communications pathways installed by this Section.
4. Section 260529 "Hangers and Supports for Electrical Systems" specifies hangers and supports for communications pathways installed by this Section.
5. Section 260533.13 "Conduits for Electrical Systems" specifies the following installed by this Section:

    a. Type EMT-A and Type EMT-SS duct raceways and elbows.
    b. Type EMT-S duct raceways and elbows.
    c. Type PVC duct raceways and fittings.
    d. Fittings for conduit, tubing, and cable.

6. Section 260533.16 "Boxes and Covers for Electrical Systems" specifies the following installed by this Section:

    a. Metallic outlet boxes, device boxes, rings, and covers.
    b. Junction boxes and pull boxes.
    c. Cover plates for device boxes.

7. Section 260533.13 "Conduits for Electrical Systems" specifies the following installed by this Section:

    a. Handholes and boxes for exterior underground wiring.
    b. Manholes for exterior underground wiring.
    c. Duct sealing.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

a. Product Listing: Include copy of unexpired approval letter, on letterhead of qualified electrical testing agency, certifying product's compliance with specified listing criteria.

1) If listed manufacturer differs from selling manufacture, indicate relationship between entities on submittal.
2) |Listing criteria identified in approval letter must match specified listing criteria. Approval of only equipment's enclosure is not considered approval of equipment for intended application.
3) Product identification in approval letter must match product branding and model numbers in submittal. Approval letters for similar products are not acceptable.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 CABLE SUPPORTS AND POSITIONING DEVICES

A. Description: This category covers straps, hooks, and similar types of hardware for installation and use in communications cabling systems in accordance with NFPA 70 and manufacturer's installation instructions

B. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.

2.2 CABLE TRAY

A. UL DWMU - J-Hook or G-Hook Cable Support:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. ADI.
c. Cablofil; Legrand North America, LLC.

d. Elite Components Inc.; subsidiary of SIGMA Piping Products (SPP) LLC.
e. Panduit Corp.
f. Southwire Company, LLC.
g. Or approved equal.

B. UL ZODZ - Cable Clamp, Clip, or Mount Positioning Device:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CADDY; brand of nVent Electrical plc.
b. Panduit Corp.
c. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
d. AFC Cable Systems; Atkore International.
e. HellermannTyton.
f. Hilti, Inc.
g. Southwire Company, LLC.
h. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 SELECTION OF PATHWAYS FOR COMMUNICATIONS SYSTEMS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NFPA 70 for selection of duct raceways. Consult Commissioner for resolution of conflicting requirements.

B. Type OFR and Type CR Communications Raceways: Comply with Table 800.154(b) of NFPA 70.

C. Outdoor Pathways:

1. Concrete Encased in Trench: PVC-40.

D. Indoor Pathways:

1. Exposed and Subject to Severe Physical Damage: IMC. Locations include the following:

a. Gymnasiums.

2. Exposed and Not Subject to Physical Damage: EMT Cable tray.
3. Concealed above Suspended Ceilings: EMT Cable tray Hooks.
4. Concealed in Ceilings and Interior Walls and Partitions: EMT.

E. Cable Supports and Positioning Devices:

1. Size hooks to allow minimum of 25 percent future capacity without exceeding design capacity limits.

2. Support hooks directly from building structure. Do not use ceiling grid support rods or wires.
3. Hook spacing must allow no more than 6 inch of slack. Lowest point of cables must be no closer than 6 inch to ceiling tiles, mechanical ductwork and fittings, luminaires, power conduits, power and telecommunications outlets, and other electrical and communications equipment.
4. Space hooks no more than 5 ft on center.
5. Provide hook at each change in direction.

F. Boxes and Enclosures:

1. Indoors: UL 50E Type 1, except use Type 4 nonmetallic units in institutional and commercial kitchens and damp or wet locations.

G. Identification of Underground Pathways, Handholes, and Structures:

1. Use "COMMUNICATIONS" for legend on warning planks, underground warning tape, and covers.

3.3 SELECTION OF GROUNDING AND BONDING PRODUCTS

A. Grounding and Bonding Conductors:

1. Communications Busbar Connections:

a. UBC: Not smaller than 6 AWG unless otherwise indicated on Drawings. Provide bolted connectors.

2. Cable Tray Connections:

a. Cable Tray Equipment Grounding Conductor: 6 AWG.
b. Cable Tray Bonding Jumper: If not supplied by cable manufacturer, provide bonding jumper not smaller than 6 AWG and not longer than 12 inch. If jumper is wire, it must be terminated with lug having two holes and long barrel for two crimps. If jumper is flexible braid, it must be terminated with one- or two-hole ferrule. Attach with bonding screw or connector provided by cable tray manufacturer.

3.4 SELECTION OF COLORS AND IDENTIFICATION MARKINGS

A. Comply with 29 CFR 1910.144 for color identification of hazards, and the following:

1. Ceiling-mounted hangers, supports, cable trays, and raceways must be finished, painted, or suitably marked safety yellow where less than 7.7 ft above finished floor.

B. Pipe and Conduit Labeling: Comply with ASME A13.1 and IEEE C2.

C. Color Coding Scheme for Communications Cable and Terminations: Comply with BICSI N1 and TIA-598.

D. Accessible Fittings for Raceways: Identify cover of junction and pull box of the following systems with wiring system legend and system voltage. System legends must be as follows:

1. "COMMUNICATIONS."
2. "SECURITY."

E. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

F. Communications Vaults, Manholes, Handholes, and Pull and Junction Boxes: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive wraparound labels to identify phase.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.

G. Equipment and Cabling Identification for Administrative Records and Labeling: Comply with TIA-606 requirements for Class 2 network administration.

H. Equipment Identification Labels:

1. Black letters on white field.
2. Indoor Equipment: Self-adhesive label .
3. Equipment To Be Labeled:

a. Racks, Frames, and Enclosures: Identify front and rear of each enclosure with self-adhesive labels containing equipment designation.
b. Patch Panels: Label individual rows and outlets, starting at left and working down, with self-adhesive labels.
c. Communications cabinets.
d. Access doors and panels for concealed communications items.
e. Security equipment.

I. Horizontal Cables: Label each cable with a self-adhesive wraparound label.

J. Cover Plates: Label individual cover plates with self-adhesive labels. Place label at top of cover plate. Identify cover plate in accordance with TIA-606.

K. Cable Ties: General purpose, for attaching tags, except as listed below:

1. In Spaces Handling Environmental Air: Plenum rated.

3.5 INSTALLATION OF PATHWAYS FOR COMMUNICATIONS SYSTEMS

A. Comply with manufacturers' published instructions, including limitations on distance, bends, and bend radius.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Type OFR Optical-Fiber Raceways: Article 800 of NFPA 70 and BICSI N1.
2. Type CR Communications Raceways: Article 800 of NFPA 70 and BICSI N1.
3. Cable Supports and Positioning Devices: Article 800 of NFPA 70 and BICSI N1.
4. Consult Commissioner for resolution of conflicting requirements.

C. Special Installation Techniques:

1. Complete communications raceway installation before starting conductor installation.
2. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.
3. Provide hangers and supports for pathways, boxes, and enclosures.
4. Firestop pathway penetrations of fire-rated assemblies.
5. Identification:

    a. Provide colors and labels for pathways, boxes, enclosures, and associated communications equipment.

        1) White backgrounds with black letters.

D. Interfaces with Other Work:

1. Coordinate installation of new communications pathways with existing conditions.
2. Grounding and Bonding: Bond metallic communications boxes and enclosures to metallic pathways. Coordinate with Section 271100 "Communications Equipment Room Fittings" for grounding and bonding of communications pathways to communications equipment room fittings.

3.6 PROTECTION

A. Protect coatings and finishes of pathways, boxes, and enclosures from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 270528

SECTION 270800 - COMMISSIONING OF COMMUNICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. This Section includes: testing of 4-UTP Category 6 and Category 6A cables.

B. Related Requirements:

1. Section 271100 "Communications Equipment Room Fittings"
2. Section 271513 "Communications Copper Horizontal Cabling"

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of testing equipment.

B. Test Results: For each cable installed.

C. Shop Drawings: Show fabrication and installation details of:

1. Include plans, elevations, sections, details, and attachments to other Work.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Test results for all cables installed.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Fluke Networks DSX Cable Analizer or comparable product by one of the following:

1. Trend Networks
2. Greenlee Communications
3. Or approved equal.

B. Description:

1. Analyzer to comprehensively certify each category rated connection and record results verifying compliance with TIA/EIA performance specifications to meet the category rating of the system.
2. Must meet or exceed TIA Level IV compliant network cable-testing device certification by an independent laboratory for verification of high speed, TIA/EIA T568 compliant cables.
3. T568 compliant cables.
4. Copper test equipment must be capable of certifying Category-6 and Category 6A UTP links or channels independent of termination hardware configuration (RJ 45 port or 110-style) for each level of performance.
5. Provide full 2-way Auto test of Category-6 and 6A twisted pair links.
6. All test equipment must be capable of storing full frequency sweep data for all tests and printing color graphical reports for all swept measurements.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section.

B. Verify telecommunications cabling is installed and supported, terminated, mounted in an appropriate housing or terminated on the applicable component and labeled prior to certification testing and documentation.

C. Verify certification tester universal interface adapters and manufacturer patch cords that enable permanent link verification are in new condition not indicating any twisting or kinking resulting from incorrect storage of the tester interface adapters.

3.3 ADJUSTING AND CLEANING

A. Remove non-compliant or otherwise damaged components.

3.4 TESTING

A. Follow manufacturers' instructions and recommended industry standards and guidlines to complete all TIA testing procedures to verify performance levels.

1. Follow manufacturer requirements for self-calibration procedures.
2. Update tester software to show specific project information including but not limited to:

   a. Date and time of testing
   b. Project name
   c. Field technicians name
   d. Cable identification number
   e. Cable manufacturer, type and part number

B. Every cabling link in the installation must be tested for the following in accordance with the field test specification defined in ANSI/TIA-568-C.2 "Commercial Balanced Twisted-Pair Telecommunications Cabling and Components Standard". This document will be referred to as the "TIA Cat 6 Standard":

1. Wire Map
2. Length
3. Insertion Loss
4. NEXT Loss
5. PS NEXT Loss
6. ACR-F Loss
7. PS ACR-F Loss
8. Return Loss
9. Propagation Delay
10. Delay Skew

C. One hundred percent of the installed cabling links must pass the requirements of the Category 6A Standard mentioned in A.1 above and as further detailed in Section B. Any failing link must be diagnosed and corrected. The corrective action must be followed with a new test to prove that the corrected link meets the performance requirements. The final and passing result of the tests for all links must be provided in the test results documentation in accordance with Section C below.

D. The test equipment (tester) must comply with the accuracy requirements for level IIIe field testers as defined in ANSI/TIA-1152. The tester including the appropriate interface adapter must meet the specified accuracy requirements. The accuracy requirements for the permanent link test configuration (baseline accuracy plus adapter contribution) are specified in Table 3 of ANSI/TIA-1152 (Table 3 in this TIA document also specifies the accuracy requirements for the Channel configuration.

E. The RJ45 test plug must fall withing the values specified in ANSI/TIA-568-C Annex C for NEXT, FEXT and Return Loss.

F. The tester must be withing the calibration period recommended by the vendor in order to achieve the vendor-specified measurement accuracy.

G. The tester interface adapters must be of high quality and the cable must not show any twisting or kinking resulting from coiling and storing of the tester interface adapters. In order to deliver optimum accuracy, preference is given to permanent link interface adapter for the tester that can be calibrated within the period recommended by the vendor. To ensure that normal handling on the job does not cause measurable Return Loss change, the adapter cord cable must not be of twisted-pair construction.

H. The Pass or Fail condition for the link-under-test is determined by the results of the required individual tests (detailed in Section 4.2.2 of ANSI/TIA-1152). Any Fail or Fail* result yields a Fail for the link-under-test. In order to achieve an overall Pass condition, the results for each individual test parameter must Pass or Pass*.

I. A Pass or Fail result for each parameter is determined by comparing the measured values with the specified test limits for that parameter. The test result of a parameter must be marked with an asterisk (*) when the result is closer to the test limit than the accuracy of the field tester. The field tester manufacturer must provide documentation as an aid to interpret results marked with asterisks. To which extent '*' results must determine approval or disapproval of the element under test must be defined in the relevant detail specification, or agreed on as a part of a contractual specification.

J. Test Results Documentation:

1. Test results saved within the field-test instrument must be transferred into a Windows-Excel and into a test management software format. These test records must be uploaded to the PC unaltered, i.e., "as saved in the field-test instruments". The file format, CSV (comma separated value), does not provide adequate protection of these records and must not be used.
2. The test results documentation must be available for inspection by the Commissioner during the installation period and must be passed to the Commissioner within 5 working days of completion of tests on cabling served by a telecommunications room or backbone cabling. The installer must retain a copy to aid preparation of as built information.
3. Circuit IDs reported by the test instrument should match the specified label ID.

    a. Remove non-compliant or otherwise damaged components.

END OF SECTION 270800

SECTION 271100 - COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Products Installed, but Not Furnished, under This Section:

1. Section 061000 "Rough Carpentry" furnishes equipment backing panels installed by this Section.
2. Section 260526 "Grounding and Bonding for Electrical Systems" furnishes the following installed by this Section:

    a. Grounding and bonding conductors.
    b. Grounding and bonding busbars.

3. Section 260529 "Hangers and Supports for Electrical Systems" furnishes hangers, supports, and concrete bases for communications equipment installed by this Section.
4. Section 260533.16 "Boxes and Covers for Electrical Systems" furnishes the following installed by this Section:

    a. Junction boxes and pull boxes.

B. Related Requirements:

1. Section 270010 "Supplemental Requirements for Communications" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 270528 "Pathways for Communications Systems" for installation of cable pathways serving communications equipment room fittings installed under this Section.

1.3 DEFINITIONS

A. Abbreviations for Communications Spaces:

1. MTR: Main Telecommunications Room

B. Abbreviations for Grounding and Bonding:

1. BBC: Backbone bonding conductor, for connecting multiple TBBs serving the same floor.
2. PBB: Primary bonding busbar; located in main distribution frame room, ideally near electrical service entrance.
3. RBB: Rack bonding busbar; located in equipment cabinets and racks.

4. SBB: Secondary bonding busbar; located in intermediate distribution frame rooms.
5. TBB: Telecommunications bonding backbone, for connecting SBBs to PBB.
6. TBC: Telecommunications bonding conductor, for connecting PBB to intersystem bonding termination device or busbar at electrical service entrance.
7. TEBC: Telecommunications equipment bonding conductor, for connecting RBBs to SBBs or PBB.
8. UBC: Unit bonding conductor, for connecting individual communications equipment to RBBs or SBBs.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Coordination Meeting(s): For communications equipment room planning. Conduct meeting(s) as videoconference before shop drawings.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Shop Drawings:

1. Communications equipment room drawings, diagrams, and supporting documents.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that communication equipment room fittings perform in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within warranty period.

1. Warranty Period: 3 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CABLE TRAY

A. All pathways for communications systems will comply with TIA/EIA-569-A, BICSI Telecom Distribution Manual and The City of New York's design standards.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

C. Will be identified as defined in NFPA 70 and marked for intended location and application.

D. Source Limitations: Obtain cable trays and components from single manufacturer.

E. Structural Performance: See articles for individual cable tray types for specific values for the following parameters:

1. Uniform Load Distribution: Capable of supporting a uniformly distributed load on the indicated support span when supported as a simple span and tested according to NEMA VE 1.
2. Concentrated Load: A load applied at midpoint of span and centerline of tray.
3. Load and Safety Factors: Applicable to both side rails and rung capacities.

F. Wire Mesh Tray

1. Finishes: Electrodeposited Zinc Plating
2. The tray will consist of continuous, rigid, welded steel wire mesh cable management system, to allow continuous ventilation of cables and maximum dissipation of heat, with UL Classified splices where tray acts as Equipment Grounding Conductor (EGC). Wire mesh cable tray will have continuous Safe-T-Edge T-welded top side wire to protect cable insulation and installers.
3. Provide splices, supports, and other fittings necessary for a complete, continuously grounded system.
4. Provide tray liner.
5. Mesh: 2x4 inches (50 x 100 mm).
6. Straight Section Lengths: 118 inches (3,000 mm)
7. Wire Diameter: Patented design includes varying wire sizes to meet application load requirements; to optimize tray strength; and to allow tray to remain lightweight.
8. Fittings: Wire mesh cable tray fittings are field-fabricated from straight tray sections, in accordance with manufacturer's instructions.
9. Sizes as shown on the floor plans.
10. The cable tray system will include all continuous grounding hardware components.

G. Ladder Rack/Telco Style Cable Runway

1. Telco style cable runway with 1-1/2" x 3/8" x 0.065" stringers, welded cross members spaced at 9" intervals.

2. Load rating: 132 lb/ft with supports spaced every 5 ft.
3. Color: black

4. Provide grounding, fittings and cable drop-outs.
5. Sizes as shown on the floor plans.
6. The cable tray system will include all continuous grounding hardware components.

H. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Chatsworth Products, Inc.
2. Cablofil
3. Cooper-B-Line
4. Or approved equal

2.2 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm).

B. A-C, exterior grade.

C. The contractor will cut plywood sheets as required to fit specific room dimensions.

2.3 EQUIPMENT RACKS AND CABINETS

A. Cabinets

1. Equipment cabinet will be used for mounting patch panels, wire management, network equipment, audiovisual and security equipment.
2. Cabinets to have sides, glass front door and perforated rear doors.
3. Cabinet must be lockable.
4. Will be of high strength aluminum construction.
5. Size 30" W x 42" D x 80" H.
6. Will have 19" mountable frame with standard EIA-310-D hole spacing. Cabinets will contain mounting dimension of a minimum of forty-four (44) rack units marked in a contrasting color.
7. Will be bolted to slab at front and rear flanges and tied to overhead ladder rack for additional stability with threaded rod and Kindorf.
8. Will be provided with equipment mounting screws (50 per cabinet minimum).
9. Will be grounded by a #6 AWG wire with green insulation to building steel. Use lug type connectors at each end.
10. Provide all required mounting hardware and accessories.
11. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Chatsworth Products Inc.
    b. Cablofil
    c. Cooper-B-Line
    d. Or approved equal

B. Cable Management

1. Cable ties used to support station cable bundles in the cable tray or other pathways above hung ceiling and to tie the cables entering the equipment racks.

    a. Will be Velcro type.

2. Distribution Rings:

    a. Split Ring Style
    b. Molded, fire-retardant material
    c. Wall mounted
    d. Nominal 2" D x 2 1/2" W

3. Horizontal Managers:

    a. Rack Mounted, 2RU high.

4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Chatsworth Products Inc.
    b. Cablofil
    c. Cooper-B-Line

d. Or approved equal

C. Grounding

1. Grounding

a. Telecommunications equipment bonding conductors and hardware.
b. Make to length using #6 AWG copper conductor and two-hole conductor, long barrel with window lug, or pre-terminated kits.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Shop Drawings: Prepare and submit the following:

1. Communications Equipment Room Drawings, Diagrams, and Supporting Documents:

a. Include plans, elevations, sections, details, and attachments to other work.
b. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
c. Equipment Racks and Cabinets: Indicate workspace requirements and access for cable connections.
d. Switchboards, Panelboards, and Safety Switches: Indicate workspace requirements and access for cable connections.
e. Grounding and Bonding: Indicate location of busbars and their mounting details showing standoff insulators and wall mounting brackets.
f. Cable Trays, Large Raceways, Ducts, and Piping: Indicate elevation and route of vertical and horizontal cable trays, raceways or ducts larger than 2 inch (50 mm) wide, and fire-suppression piping located inside communications equipment room.
g. Luminaires: Indicate elevation, orientation, and size of luminaires inside the communications equipment room for coordination with cable trays, equipment racks, cabinets, and other equipment.
h. Access Panels: Indicate locations, dimensions, and clearances required to open access panels in ducts, walls, or ceilings inside communications equipment room.
i. Controls: Indicate locations of sensors, switches, and push-buttons for HVAC, fire suppression, fire alarm, and standby power.
j. Adjust configurations and locations of distribution frames, cross-connects, and patch panels in equipment rooms to accommodate and optimize configurations and space requirements of communications equipment.
k. Adjust configurations and locations of equipment with distribution frames, cross-connects, and patch panels of cabling systems of other communications, electronic safety and security, and related systems that share space in equipment room.

2. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

B. Contact telecommunications service provider and arrange for installation of demarcation point, protected entrance terminals, and a housing when so directed by service provider.

3.3 SELECTION OF GROUNDING AND BONDING PRODUCTS FOR COMMUNICATIONS

A. Grounding and Bonding Conductors:

1. Communications Busbar Connections:

a. UBC: Not smaller than 6 AWG unless otherwise indicated on Drawings. Provide bolted connectors.
b. Bonding Conductors to Structural Steel: Not smaller than 6 AWG unless otherwise indicated on Drawings. Provide bolted clamp connectors.

2. Cable Tray Connections:

a. Cable Tray Equipment Grounding Conductor: 6 AWG.
b. Cable Tray Bonding Jumper: If not supplied by cable manufacturer, provide bonding jumper not smaller than 6 AWG and not longer than 12 inches. If jumper is wire, it must be terminated with lug having one hole and standard barrel for one crimp. If jumper is flexible braid, it must be terminated with one-hole ferrule. Attach with bonding screw or connector provided by cable tray manufacturer.

B. Grounding and Bonding Busbars:

1. PBB:

a. Dimensions: 1/4 inch thick by 4 inch high.
b. Stand-Off Distance: 2 inches.

3.4 SELECTION OF COLORS AND IDENTIFICATION MARKINGS

A. Comply with 29 CFR 1910.144 for color identification of hazards, and the following:

1. Ceiling-mounted hangers, supports, cable trays, and raceways must be finished, painted, or suitably marked safety yellow where less than 7.7 ft above finished floor.

B. Pipe and Conduit Labeling: Comply with ASME A13.1.

C. Color Coding Scheme for Communications Cable and Terminations: Comply with BICSI N1 and TIA-598.

D. Accessible Fittings for Raceways: Identify cover of junction and pull box of the following systems with wiring system legend and system voltage. System legends must be as follows:

1. "COMMUNICATIONS."
2. "FIRE ALARM."

3. "SECURITY."

E. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

F. Locations of Underground Lines: Underground-line warning tape for communication, control wiring, and optical-fiber cable.

G. Communications Vaults, Manholes, Handholes, and Pull and Junction Boxes: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive wraparound labels to identify phase.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft (15 m) maximum intervals in straight runs, and at 25 ft (7.6 m) maximum intervals in congested areas.

H. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with conductor or cable designation, origin, and destination.

I. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive labels with conductor designation.

J. Equipment and Cabling Identification for Administrative Records and Labeling: Comply with TIA-606 requirements for Class 2 network administration.

K. Equipment Identification Labels:

1. Black letters on white field.
2. Indoor Equipment: Self-adhesive label.
3. Equipment to Be Labeled:

a. Racks, Frames, and Enclosures: Identify front and rear of each enclosure with self-adhesive labels containing equipment designation.
b. Patch Panels: Label individual rows and outlets, starting at to left and working down, with self-adhesive labels.
c. Communications cabinets.
d. Access doors and panels for concealed communications items.
e. Emergency system boxes and enclosures.
f. Contactors.
g. Remote-controlled switches, dimmer modules, and control devices.
h. Monitoring and control equipment.
i. Fire-alarm equipment.
j. Security equipment.
k. Life-safety communications equipment.

L. Backbone Cables: Label each cable with a self-adhesive wraparound label indicating the location of the far or other end of the backbone cable. Patch panel or punch down block where cable is terminated should be labeled identically.

M. Horizontal Cables: Label each cable with a self-adhesive wraparound label.

N. Cover Plates: Label individual cover plates with self-adhesive labels. Place label at top of cover plate. Identify cover plate in accordance with TIA-606.

O. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.5 SELECTION OF SIGNS AND HAZARD MARKINGS

A. Comply with 29 CFR 1910.145 for danger, caution, warning, and safety instruction signs.

B. Signs, labels, and tags required for personnel safety must comply with the following standards:

1. Safety Colors: NEMA Z535.1.
2. Facility Safety Signs: NEMA Z535.2.
3. Safety Symbols: NEMA Z535.3.
4. Product Safety Signs and Labels: NEMA Z535.4.
5. Safety Tags and Barricade Tapes for Temporary Hazards: NEMA Z535.5.

3.6 FIELD-FABRICATION OF FITTINGS FOR ENTRANCE FACILITY

A. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Designated Critical Operations Areas: Comply with Article 708 of NFPA 70.
2. Communications Systems: Comply with Ch. 8 of NFPA 70 and with BICSI N1.
3. Grounding and Bonding: Comply with Article 250 of NFPA 70 and with BICSI N3.
4. Consult Commissioner for resolution of conflicting requirements.

B. Provide the following specified products in entrance facility room or space:

1. Quantity as indicated on Drawings of equipment backing panel.

   a. Install from 6 inch to 8 ft, 6 inches above finished floor. If plywood is fire treated, ensure that fire-treatment stamp is visible after installation.

2. Quantity as indicated on Drawings of PBB.
3. Quantity as indicated on Drawings of duplex straight-blade receptacle, outlet box, and cover plate.
4. Quantity as indicated on Drawings of locking receptacle, outlet box, and cover plate.
5. Quantity as indicated on Drawings of 19 inch open equipment rack with RBB and enclosure-mounted relocatable power tap.
6. Quantity as indicated on Drawings of patch panel.

3.7 FIELD-FABRICATION OF FITTINGS FOR TELECOMMUNICATIONS ROOMS

A. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Designated Critical Operations Areas: Comply with Article 708 of NFPA 70.
2. Communications Systems: Comply with Ch. 8 of NFPA 70 and with BICSI N1.

3. Grounding and Bonding: Comply with Article 250 of NFPA 70 and with BICSI N3.
4. Consult The Commissioner for resolution of conflicting requirements.

B. Provide the following specified products in intermediate distribution frame room or space:

1. Quantity as indicated on Drawings of equipment backing panel.

   a. Install from 6 inch to 8 ft, 6 inch above finished floor. If plywood is fire treated, ensure that fire-treatment stamp is visible after installation.

2. Quantity as indicated on Drawings of NEMA L5-20R, NEMA L6-20R, and NEMA L6-30R locking receptacle, outlet box, and cover plate.

3.8 INSTALLATION OF BONDING FOR COMMUNICATIONS

A. Grounding of Communications: Bond PBB and SBBs to grounding electrode conductors at electrical power service entrance, and at electrical power derived systems serving communications equipment, using intersystem bonding termination device.

1. Structural Steel: Where structural steel of steel frame building is readily accessible within room or space, bond each SBB and PBB to vertical steel of building frame.

B. Comply with manufacturer's published instructions.

C. Reference Standards:

1. Bonding of Communications: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with BICSI N3.
2. Consult the Commissioner for resolution of conflicting requirements.

D. Special Techniques:

1. Bonding of Busbars:

   a. Indicate locations of grounding busbars on Drawings. Install busbars horizontally, on insulated spacers 12 inch (300 mm) above finished floor unless otherwise indicated.
   b. Where busbars are indicated on both sides of doorways, route bonding conductor up to top of door frame, across top of doorway, and down; connect to continuation of horizontal busbar.

2. Bonding Conductors:

   a. Stacking of conductors under a single bolt is not permitted when connecting to busbars.
   b. Assemble wire connector to conductor, complying with manufacturer's published instructions and as follows:

      1) Use crimping tool and die specific to connector.
      2) Pretwist conductor.
      3) Apply antioxidant compound to bolted and compression connections.

c. Install in straightest and shortest route between origination and termination point, and no longer than required. Bend radius must not be smaller than 10 times diameter of conductor. No single bend may exceed 90 degrees.
d. Install without splices.
e. Support conductors at not more than 36 inch (900 mm) intervals.
f. Outside telecommunications rooms, install conductors in metric designator 21 (trade size 3/4) PVC-80 conduit until conduit enters telecommunications room. Install bonding conductors in EMT-A or EMT-SS when routed through plenum. Do not install bonding conductors in EMT-S unless otherwise indicated on Drawings.

1) If bonding conductor must be installed in EMT-S or other ferrous metallic raceway, bond conductor to raceway using grounding bushing and bond both ends of raceway to SBB.

3. Provide TBC and terminate ends to PBB and intersystem bonding busbar at electrical service entrance in accordance with Section 250.94, "Bonding for Communication Systems," of NFPA 70.
4. Busbar Interconnections: Bond SBBs to PBB with TBBs. If more than one TBB is installed, bond TBBs together with BBCs where required by TIA-607.
5. Communications Enclosures: Bond metallic enclosures of telecommunications equipment with UBCs to nearest SBB or PBB.
6. Equipment Racks: Bond metallic components of enclosures to RBB using UBCs. Provide top-mounted RBB if not provided by enclosure or rack manufacturer. Bond RBB to SBB with TEBC. Power connection must comply with NFPA 70; equipment grounding conductor in power cord of cord- and plug-connected equipment must be considered supplemental to bonding requirements in this Section.
7. Shielded Cable: Bond shield of shielded cable to SBB in communications rooms and spaces. Comply with TIA-568.1 and TIA-568.2 when grounding shielded balanced twisted-pair cables.
8. Primary Protector: Bond to PBB with insulated bonding conductor.
9. Electrical Power Panelboards: Where electrical panelboards for communications equipment are located in the same room or space, bond each ground bar of panelboard to SBB.
10. Cable Trays: Provide continuous electrical path by installing bonding clips and jumpers. Bond each end to nearest SBB.
11. Ladder Racks: Provide continuous electrical path by installing bonding clips and jumpers. Bond each end to nearest SBB.

3.9 PROTECTION

A. After installation, protect communications equipment room fittings from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

END OF SECTION 271100

SECTION 271513 - COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. This section describes the components and practices to be used when installing horizontal cabling.

B. Section Includes:

1. Category 6 twisted pair cable.
2. Category 6A twisted pair cable.
3. Twisted pair cable hardware.
4. Cable management system.
5. Identification products.

C. Related Requirements:

1. Section 260529 "Hangers and Supports for Electrical Systems".

2. Section 260533.13 "Conduits for Electrical Systems".

3. Section 270800 "Commissioning of Communications".

4. Section 271100 "Communications Equipment Room Fittings".

1.3 DEFINITIONS

A. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

B. EMI: Electromagnetic interference.

C. IDC: Insulation displacement connector.

D. Jack: Also commonly called an "outlet," it is the fixed, female connector.

E. LAN: Local area network.

F. Plug: Also commonly called a "connector," it is the removable, male telecommunications connector.

G. UTP: Unscreened (unshielded) twisted pair.

1.4 COPPER HORIZONTAL CABLING DESCRIPTION

A. Horizontal cable cabling system will provide interconnections between Distributor A, Distributor B, or Distributor C, and the equipment outlet, otherwise known as "Cabling Subsystem 1," in the telecommunications cabling system structure. Cabling system consists of horizontal cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for horizontal-to-horizontal cross-connection.

1. TIA-568-C.1 requires that a minimum of two equipment outlets be installed for each work area.
2. Horizontal cabling will contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications equipment outlet.
3. Bridged taps and splices will not be installed in the horizontal cabling.

B. A work area is approximately 100 sq. ft., and includes the components that extend from the equipment outlets to the station equipment.

C. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data:

1. Category 6 twisted pair cable.
2. Category 6A twisted pair cable.
3. Twisted pair cable hardware.
4. Cable management system.
5. Identification products.

B. Shop Drawings: Reviewed and stamped by RCDD.

1. System Labeling Schedules:

a. Electronic copy of labeling schedules, in software and format selected by Commissioner.

2. Cabling administration Drawings and printouts.
3. Wiring diagrams and installation details of telecommunications equipment, to show location and layout of telecommunications equipment, including the following:

a. Telecommunications rooms plans and elevations.
b. Telecommunications pathways.
c. Telecommunications system access points.
d. Telecommunications grounding system.

e. Telecommunications conductor drop locations.
f. Typical telecommunications details.
g. Mechanical, electrical, and plumbing systems.

C. Twisted pair cable testing plan.

D. Samples: For telecommunications jacks and plugs, in specified finish, one for each type and configuration and cover plates for color selection and evaluation of technical features.

E. Field quality-control reports.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of product.

C. Source quality-control reports.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: For splices and connectors to include in maintenance manuals.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

C. Testing Agency Qualifications: Testing agency must have personnel certified by BICSI on staff.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.

1. Test each pair of twisted pair cable for open and short circuits.

1.11 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.12 COORDINATION

A. Coordinate layout and installation of telecommunications pathways and cabling with City of New York's telecommunications and LAN equipment and service suppliers.

1.13 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that communications copper horizontal cabling perform in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Horizontal cabling system must comply with transmission standards in TIA-568-C.1, when tested according to test procedures of this standard.

B. Telecommunications Pathways and Spaces: Comply with TIA-569-D.

C. Grounding: Comply with TIA-607-B.

2.2 GENERAL CABLE CHARACTERISTICS

A. Listed and labeled by an NRTL as complying with the applicable standard and NFPA 70 for the following types:

1. Communications, Plenum Rated:

a. Type CMP complying with UL 1685.
b. Type CM, Type CMG, Type CMP, Type CMR, or Type CMX in metallic conduit installed according to NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."

2. Communications, Non-Plenum Rated:

a. Type CMP or Type CMR in listed plenum or riser communications raceway.
b. Type CMP or Type CMR in metallic conduit installed according to NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."

B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.3 CATEGORY 6 TWISTED PAIR CABLE

A. Category 6 Twisted Pair Cable: 100-ohm 4-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6 cable at frequencies up to 250 MHz.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Berk-Tek .
2. CommScope, Inc.
3. General Cable; Prysmian Group North America.
4. Superior Essex Inc.
5. Hubbell.
6. Or approved equal.

C. Standard: Comply with NEMA WC 66/ICEA S-116-732 and TIA-568-C.2 for Category 6 cables.

D. Electrical and transmission must meet or exceed:

1. ISO/IEC 11801 Class Ea for electrical performance specifications.
2. ANSI/TIA-568-C for performance specifications.

E. Conductors: 100-ohm, 23 AWG solid copper.

F. Shielding/Screening: Unshielded twisted pairs (UTP).

G. Cable Rating: Plenum.

H. Jacket: White thermoplastic.

2.4 CATEGORY 6A TWISTED PAIR CABLE

A. Category 6A Twisted Pair Cable: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6A cable at frequencies up to 500 MHz.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Berk-Tek Leviton.
2. CommScope, Inc.
3. General Cable; Prysmian Group North America.
4. Superior Essex Inc.
5. Hubbell.
6. Or approved equal.

C. Standard: Comply with TIA-568-C.2 for Category 6A cables.

D. Conductors: 100-ohm, 23 AWG solid copper.

E. Shielding/Screening: Unshielded twisted pairs (UTP).

F. Cable Rating: Plenum.

G. Jacket: White thermoplastic.

2.5 TWISTED PAIR CABLE HARDWARE

A. Twisted Pair Cable Hardware: Hardware designed to connect, splice, and terminate twisted pair copper communications cable.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CommScope, Inc.
2. Hubbell Premise Wiring; Hubbell Incorporated, Commercial and Industrial.
3. Leviton Manufacturing Co., Inc.
4. Panduit Corp.
5. Ortronics.
6. Or approved equal.

C. General Requirements for Twisted Pair Cable Hardware:

1. Comply with the performance requirements of Category 6 and Category 6A.
2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
3. Cables will be terminated with connecting hardware of same category or higher.

D. Source Limitations: Obtain twisted pair cable hardware from same manufacturer as twisted pair cable, from single source.

E. Connecting Blocks:

1. 110-style IDC for Category 6.
2. 110-style IDC for Category 6A.
3. Provide blocks for the number of cables terminated on the block, plus 25 percent spare, integral with connector bodies, including plugs and jacks where indicated.

F. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.

1. Features:

a. Universal T568A and T568B wiring labels.
b. Labeling areas adjacent to conductors.
c. Replaceable connectors.
d. 24 or 48 ports.

2. Construction: 16-gauge steel and mountable on 19-inch equipment racks.
3. Number of Jacks per Field: One for each four-pair cable indicated plus 25 percent spare.

G. Patch Cords: Factory-made, four-pair cables in 60-inch, 84-inch, and 108-inch lengths; terminated with an eight-position modular plug at each end.

1. Patch cords must have bend-relief-compliant boots and color-coded icons to ensure performance.

2. Patch cords must have latch guards to protect against snagging.
3. Patch cords must have color-coded boots for circuit identification.

H. Plugs and Plug Assemblies:

1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
2. Standard: Comply with TIA-568-C.2.
3. Marked to indicate transmission performance.

I. Jacks and Jack Assemblies:

1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
2. Designed to snap-in to a patch panel or cover plate.
3. Standard: Comply with TIA-568-C.2.
4. Marked to indicate transmission performance.

J. Cover Plate:

1. Two, Four, Six port, vertical single gang cover plates designed to mount to single gang wall boxes.
2. Plastic Cover Plate: High-impact plastic. Coordinate color with Section 260533.16 "Boxes and Covers for Electrical Systems."
3. For use with snap-in jacks accommodating any combination of twisted pair, optical fiber, and coaxial work area cords.

K. Legend:

1. Machine printed, in the field, using adhesive-tape label.
2. Snap-in, clear-label covers and machine-printed paper inserts.

2.6 WORK AREA OUTLETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CommScope, Inc.
2. Hubbell Premise Wiring; Hubbell Incorporated, Commercial and Industrial.
3. Leviton Manufacturing Co., Inc.
4. Panduit Corp.
5. Superior Essex Inc.
6. Ortronics.
7. Or approved equal.

2.7 IDENTIFICATION PRODUCTS

A. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.8 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.

B. Factory test cables on reels according to TIA-568-C.1.

C. Factory test twisted pair cables according to TIA-568-C.2.

D. Cable will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 WIRING METHODS

A. Routing:

1. Install cables in raceways and cable trays, except within consoles, cabinets, desks, and counters except in accessible ceiling spaces, attics, and gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables, except in unfinished spaces.

   a. Install plenum cable in environmental air spaces, including plenum ceilings.
   b. Comply with requirements for raceways and boxes specified in Section 270528 "Pathways for Communications Systems."

2. Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

B. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools. Install conductors parallel with or at right angles to sides and back of enclosure.

3.3 INSTALLATION OF PATHWAYS

A. Comply with requirements for demarcation point, cabinets, and racks specified in Section 271100 "Communications Equipment Room Fittings."

B. Comply with Section 270528 "Pathways for Communications Systems."

C. Comply with Section 260529 "Hangers and Supports for Electrical Systems."

D. Drawings indicate general arrangement of pathways and fittings.

3.4 INSTALLATION OF TWISTED-PAIR HORIZONTAL CABLES

A. Comply with NECA 1 and NECA/BICSI 568.

B. General Requirements for Cabling:

1. Comply with TIA-568-C.0, TIA-568-C.1, and TIA-568-C.2.
2. Comply with BICSI's "Information Transport Systems Installation Methods Manual (ITSIMM), Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section.
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.
5. Terminate all conductors; no cable will contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
6. MUTOA will not be used as a cross-connect point.
7. Consolidation points may be used only for making a direct connection to equipment outlets:

    a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
    b. Locate consolidation points for twisted-pair cables at least 49 feet from communications equipment room.

8. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
9. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
10. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section. Use lacing bars and distribution spools.
11. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation, and replace it with new cable.
12. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps will not be used for heating.
13. In the communications equipment room, install a 10-foot- long service loop on each end of cable.
14. Pulling Cable: Comply with BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Pulling and Installing Cable" Section. Monitor cable pull tensions.

C. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend twisted pair cabling, not in a wireway or pathway, a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
3. Cable will not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

D. Group connecting hardware for cables into separate logical fields.

E. Separation from EMI Sources:

1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-D for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment will be as follows:

    a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
    b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
    c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment will be as follows:

    a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
    b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
    c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.

4. Separation between communications cables in grounded metallic raceways, power lines, and electrical equipment located in grounded metallic conduits or enclosures will be as follows:

    a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
    b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
    c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.

5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.5 FIRESTOPPING

A. Comply with requirements in Section 078413 "Penetration Firestopping."

B. Comply with TIA-569-D, Annex A, "Firestopping."

C. Comply with "Firestopping Systems" Article in BISCI's "Telecommunications Distribution Methods Manual."

3.6 GROUNDING

A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.

B. Install grounding according to the "Grounding, Bonding, and Electrical Protection" chapter in BICSI's "Telecommunications Distribution Methods Manual."

C. Comply with TIA-607-B and NECA/BICSI-607.

D. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall, allowing at least a 2-inch clearance behind the grounding bus bar. Connect grounding bus bar to suitable electrical building ground, using a minimum No. 4 AWG grounding electrode conductor.

E. Bond metallic equipment to the grounding bus bar, using not smaller than a No. 6 AWG equipment grounding conductor.

3.7 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA-606-B.

1. Administration Class: Class 2.

B. Paint and label colors for equipment identification must comply with TIA-606-B for Class 2 level of administration, including optional identification requirements of this standard.

C. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.

E. Cable and Wire Identification:

1. Label each cable between 6" and 12" from each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
3. Label each terminal strip, and screw terminal in each cabinet, rack, or panel.

   a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group, extended from a panel or cabinet to a building-mounted device, with the name and number of a particular device.
   b. Label each unit and field within distribution racks and frames.

4. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and -connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

F. Labels must be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-B requirements for the following:

1. Cables use flexible vinyl or polyester that flexes as cables are bent.

3.8 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Visually inspect jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568-C.1.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test twisted pair cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.

   a. Test instruments must meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturers for channel or link test configuration.

C. Data for each measurement must be documented. Data for submittals must be printed in a summary report that is formatted similarly to Table 10.1 in BICSI's "Telecommunications Distribution Methods Manual," or will be transferred from the instrument to the computer, saved as text files, printed, and submitted.

D. Nonconforming Work:

1. End-to-end cabling will be considered defective if it does not pass tests and inspections.
2. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

E. Collect, assemble, and submit test and inspection reports.

END OF SECTION 271513

SECTION 280010 –SUPPLEMENTAL REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Supplemental requirements generally applicable to the Work specified in Division 28.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for abbreviations and acronyms for electrical terms and units of measure, abbreviations and acronyms for electrical raceway types, abbreviations and acronyms for electrical cable types, and additional coordination drawing submittal requirements.

1.3 REFERENCES

A. Abbreviations and Acronyms for Electronic Safety and Security:

1. ACU: (mass notification) Autonomous control unit.
2. BMS: Building management system.
3. FACU: Fire-alarm control unit.
4. HPSA: (mass notification) High power speaker array.
5. LOC: (mass notification) Local operator console.
6. PoE: Power over Ethernet.
7. POTS: Plain old telephone service. See "public switched telephone network."
8. SCBA: Self-contained breathing apparatus.
9. TCP/IP: Transmission control protocol/Internet protocol.

B. Definitions for Electronic Safety and Security:

1. Public Switched Telephone Network (PSTN): Analog telephone technology that uses twisted-pair cables from a telephone-provider central office for the transmission medium. PSTN refers to the telephone network; POTS refers to the individual subscriber line.
2. Remote Office Phone System (ROPS): VoIP system that allows phones for a business or organization located anywhere in the world with internet connectivity to behave similar to phones connected to a PBX.
3. Voice over Internet Protocol (VoIP): Digital telephone packet technology that uses the internet for its transmission medium.

1.4 PREINSTALLATION MEETINGS

A. Electronic Safety and Security Preconstruction Conference: Schedule conference with Commissioner not later than 10 days after notice to proceed. Agenda topics include, but are not limited to, the following:

1. Installation schedule for security, fire-alarm, and other life safety systems.
2. Monitoring services work coordination and monitoring service requests.
3. Electronic Safety and Security Commissioning activities.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Coordination Drawings: Submit multidiscipline coordination drawings depicting electronic safety and security equipment, devices, cabling, conduit, and duct banks in accordance with requirements specified in Section 260010 "Supplemental Requirements for Electrical."

1.7 INFORMATIONAL SUBMITTALS

A. Installation Schedule for Security, Fire Alarm, and Other Life Safety Systems: At preconstruction meeting, and periodically thereafter as dates change, provide schedule for installation of security, fire alarm, and other life safety Work to Commissioner including, but not limited to, milestone dates for the following activities:

1. Submission of specified coordination drawings.
2. Submission of action submittals specified in Division 28.
3. Security and fire-alarm system outages.
4. Security and fire-alarm system inspection and activation.
5. Closing of walls and ceilings containing security and fire-alarm Work.
6. System startup, testing, security and fire-alarm equipment commissioning activities.
7. System startup and testing for fire-alarm interfaces with Work specified in other divisions.
8. System startup and testing for automation systems (SCADA, BMS, lighting, HVAC, fire alarm, fire pump, etc.).

1.8 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Provide emergency operation, normal operation, and preventive maintenance manuals for each system, equipment, and device listed below:
2. Include the following information:

a. Manufacturer's operating specifications.
b. User's guides for software and hardware.

c. Schedule of maintenance material items recommended to be stored at Project site.
d. Detailed instructions covering operation under both normal and abnormal conditions.
e. Manufacturer's instructions for setting field-adjustable components.
f. Manufacturer's instructions for testing, adjusting, and reprogramming microprocessor controls.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Names, versions, and website addresses for locations of installed software.
3. Device address list.

C. Software:

1. Program Software Backup: Provide username and password for approved online or cloud solution.

1.9 FIELD CONDITIONS

A. Modeling, analysis, product selection, installation, and quality control for Work specified in Division 28 must comply with requirements specified in Section 260010 "Supplemental Requirements for Electrical."

1.10 QUALITY ASSURANCE

A. Refer to DDC General Conditions, Section 014000 "Quality Requirements".

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF ELECTRONIC SAFETY AND SECURITY WORK

A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' instructions, comply with NFPA 70, NFPA 72, NFPA 731, and NECA NEIS 1 for installation of Work specified in Division 28. Consult Commissioner for resolution of conflicting requirements.

3.3 FIELD QUALITY CONTROL

A. Administrant for Security Tests and Inspections:

1. Administer and perform tests and inspections.

3.4 CLOSEOUT ACTIVITIES

A. Demonstration:

1. Demonstrate to City of New York's personnel how to operate the following systems and equipment:

a. Provide instructional video demonstrating operation by building occupants of intercom entry system specified in Section 281523 "Intercom Entry Systems."

B. Instruction:

1. With assistance from factory-authorized service representatives, instruct City of New York's personnel on the following topics:

a. How to adjust and operate access control workstations, software, and databases specified in Section 281300 "Access Control Software and Database Management."
b. How to adjust and operate hardware, enroll users, and issue user credentials specified in Section 281500 "Integrated Access Control Hardware Devices."
c. How to enroll users and issue user credentials specified in Section 281513 "Access Control Credentials."
d. How to adjust and operate hardware, enroll users, and issue user credentials specified in Section 281523 "Intercom Entry Systems."
e. How to adjust and operate video surveillance equipment specified in Section 282000 "Video Surveillance."
f. How to adjust and operate intrusion detection system equipment specified in Section 283100 "Intrusion Detection". Comply with documentation and user training provisions in Chapter 4 of NFPA 731.

END OF SECTION 280010

SECTION 281000 - ACCESS CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Access control system.

B. Related Requirements:

1. Section 087100 "Door Hardware" specifies the following:

   a. Electric strike(s).
   b. Electromagnetic lock(s).
   c. Delayed-egress electromagnetic lock(s).
   d. Electromechanical lock(s).
   e. Self-contained electronic lock(s).
   f. Exit lock(s) and alarm(s).
   g. Auxiliary electrified door hardware.

2. Section 281300 "Access Control Software and Database Management" specifies the following:

   a. Access control system unit operating system software.
   b. Access control system supplementary computer equipment operating system software.

3. Section 281400 "Access Control System Hardware" specifies the following:

   a. Access control system server(s).
   b. Access control system door controller(s).
   c. Access control system input/output interface(s).
   d. Access control system power supply and battery charger(s).
   e. Access control system terminal(s).
   f. Access control system printer(s) and encoder(s).

4. Section 281500 "Integrated Access Control Hardware Devices" specifies the following:

   a. Proximity reader(s) for card, fob, or smartphone.
   b. Access control cards.
   c. REX motion sensor(s).
   d. REX push-button(s).

5. Section 281513 "Access Control Credentials" specifies the following:

    a. Access control cards.
    b. Wireless key fobs.

6. Section 281523 "Intercom Entry Systems" specifies the following:

    a. Digital audio-video intercom entry system(s).

1.3 DEFINITIONS

A. DGP: Data gathering panel.

B. NFC: Near field communications.

C. REX: Request-to-exit.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Shop Drawings:

1. Project general notes.
2. Head-end hardware, equipment, and device locations.
3. All access control equipment and device locations on plans.
4. Block diagram and cable/conduit routing illustrating end-to-end system wiring.
5. End-to-end system communications details.
6. Secondary power calculations.

B. Field quality-control reports.

1.6 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.7 CLOSEOUT SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Installation and programming instructions for operating system software, including all applicable software add-ons.
2. Manufacturer's recommended setup and testing procedure for operating system software and applicable software add-ons.

3. Troubleshooting instructions for operating system software and applicable software add-ons.
4. Installation instructions for access control system door controllers.
5. Installation instructions for access control system workstation.
6. Installation instructions for access control system power supplies and battery chargers.
7. Installation instructions for access control system printers.
8. Manufacturer's recommended testing and inspection procedure for operation of access control system servers, panels, input/output interfaces, door controllers, and workstations.
9. Manufacturer's recommended testing and inspection procedure for operation of access control system power supplies and battery chargers.
10. Printing, programming, and handling instructions for access control credentials.
11. Manufacturer's recommended tests and inspections for access control remote devices.
12. Manufacturer's recommended tests and inspections for intercom entry systems.
13. Manufacturer's recommended testing and inspection procedure for end-to-end operation of access control system software, hardware, and integrated hardware devices.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that the access control system performs in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within warranty period.

1. Warranty Period: 3 years from date of Substantial Completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF ACCESS CONTROL SYSTEM

A. Description: Access control system provides a means of regulating or controlling physical entry into an area, or access to or use of a device by electrical, electronic, and/or mechanical means. Typical access control system includes a card reader at a controlled door, which reads a user credential and sends the collected data to a centrally located DGP over the cabling infrastructure. DGP may hold a user database onboard or may communicate with a user database over the network. If user is authorized for access at a controlled door, DGP signals the electronic lock at the door to unlock. If user credential is not authorized according to user database, the door remains locked and access is denied. In addition to card readers and electronic locks, access control systems may include various other connected devices programmed for a desired function.

B. Performance Criteria:

1. Regulatory Requirements:

   a. Components listed and labeled in accordance with NFPA 70 and NFPA 72, by qualified electrical testing laboratory and marked for intended location and application.
   b. Comply with NFPA 1, NFPA 730, NFPA 731, and ICC IBC.
   c. Certification: Provide certificate, authorized under UL Certification Service, that access control system installation complies with installation requirements of UL CCN ALOV.

2. Listing Criteria: UL CCN ALOV and UL CCN ALVY; including UL 294.
3. Consult Commissioner for resolution of conflicting requirements.

C. Selection of Access Control System Components:

1. Source Limitations: Obtain components for access control system from sources approved by manufacturer warranting performance of entire system.
2. Provide the following specified products with the access control system:

   a. Access Control Software and Database Management:

      1) Access control system unit operating system software.
      2) Access control system unit antivirus and security protection software.
      3) Visitor management database software.
      4) Mobile credential validation database software.
      5) Access control system supplementary computer equipment operating system software.
      6) Access control system supplementary computer equipment antivirus and security protection software.
      7) Credential card personalization software.
      8) Credential card printer and encoder software.

   b. Access Control System Hardware:

      1) Quantity as indicated on Drawings of access control system server(s).
      2) Quantity as indicated on Drawings of access control system door controller(s).
      3) Quantity as indicated on Drawings of access control system input/output interface(s).
      4) Quantity as indicated on Drawings of access control system power supply and battery charger(s).
      5) Quantity as indicated on Drawings of access control system workstation(s).
      6) Quantity as indicated on Drawings of access control system printer(s) and encoder(s).

   c. Security Door Hardware:

      1) Quantity as indicated on Drawings of electromagnetic lock(s). Refer to drawing A-630 "Door Types and Schedule" and to specification section 087100 "Door Hardware".
      2) Quantity as indicated on Drawings of exit lock(s) and alarm(s). Refer to drawing A-630 "Door Types and Schedule" and to specification section 087100 "Door Hardware".
      3) Quantity as indicated on Drawings of panic exit device(s) with electric strike. Refer to drawing A-630 "Door Types and Schedule" and to specification section 087100 "Door Hardware".

d. Integrated Credential Readers and Entry Management:

1) Quantity as indicated on Drawings of proximity reader(s) for card, fob, or smartphone. Refer to drawing A-630 "Door Types and Schedule" and to specification section 087100 "Door Hardware".
2) Quantity as indicated on Drawings of LCD alarm keypad(s). Refer to drawing A-630 "Door Types and Schedule" and to specification section 087100 "Door Hardware".

e. Access Control Credentials:

1) Quantity as indicated on Drawings of access control cards. Refer to drawing A-630 "Door Types and Schedule" and to specification section 087100 "Door Hardware".

f. Intercom Entry Systems:

1) Quantity as indicated on Drawings of digital audio-video intercom entry system(s). Refer to drawing A-630 "Door Types and Schedule" and to specification section 087100 "Door Hardware".

D. Interfaces with Other Work:

1. Coordinate with Section 087100 "Door Hardware" for interfacing access control system devices with door hardware.
2. Coordinate with Section 142400 "Hydraulic Elevators" for interfacing access control system with elevator controls.
3. Coordinate with Section 284621.11 "Addressable Fire-Alarm Systems" for unlocking secured doors that are in exit ways, with or without delay.

E. Systems Integration:

1. Coordinate with Section 283100 "Intrusion Detection" for integrating access control system with intrusion detection system.
2. Coordinate with Section 282000 "Video Surveillance" for integrating access control system with video surveillance controls.

3.3 FIELD QUALITY CONTROL OF ACCESS CONTROL SYSTEM COMPONENTS

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Perform manufacturer's recommended tests and inspections for access control system components.
2. Perform industry standard tests and inspections for power supplies, batteries, and other standby power provisions.
3. Verify monitoring of access control system status and diagnostics information.

C. Nonconforming Work:

1. Access control equipment will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Collect, assemble, and submit test and inspection reports.

3.4 SYSTEM STARTUP

A. Perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's published instructions.

3.5 ADJUSTING

A. Control Sensor Adjustments: Adjust control devices to suit actual occupied conditions.

1. For proximity motion sensors, verify operation at outer limits of detector range. Set time delay to suit City of New York's operations.

3.6 PROTECTION

A. After installation, protect access control system components from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

END OF SECTION 281000

SECTION 281300 - ACCESS CONTROL SOFTWARE AND DATABASE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Software for access control system units.
2. Software for access control system supplementary computer equipment.

B. Related Requirements:

1. Section 280010 "Supplemental Requirements for Electronic Safety and Security" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 281000 "Access Control".
3. Section 281400 "Access Control System Hardware" for hardware required to run software specified in this Section.
4. Section 281500 "Integrated Access Control Hardware Devices" for access control field devices controlled by software specified in this Section.

1.3 DEFINITIONS

A. RAM: Random-access memory.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Software for access control system units.
2. Software for access control system supplementary computer equipment.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation and testing and troubleshooting instructions issued to Installer by manufacturer for the following:

1. Installation and programming instructions for operating system software, including all applicable software add-ons.
2. Manufacturer's recommended setup and testing procedure for operating system software and applicable software add-ons.
3. Troubleshooting instructions for operating system software and applicable software add-ons.
4. Installation and programming instructions for antivirus and security protection software.
5. Manufacturer's recommended setup and testing procedure for antivirus and security protection software.
6. Troubleshooting instructions for antivirus and security protection software.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 SOFTWARE FOR ACCESS CONTROL SYSTEM UNITS

A. Description: This category covers software products intended for installation on access control system units.

B. Performance Criteria:

1. Listing Criteria:

a. Cybersecurity: UL CCN CYBR; including UL 2900-1 and UL 2900-2-3.
b. Access Control System Functionality: UL CCN ALVY; including UL 294.
c. Hardware that Interfaces with Fire Alarm or Mass Notification: UL CCN UOJK; including UL 864.

C. Access Control System Unit Operating System Software:

1. Sole Source Product: Genetec Synergis

a. No Substitutions Permitted.

2. Additional Characteristics:

a. Provides event logging, notification, and escalation.
b. Provides threat-level management and response actions.
c. Provides dashboard view of system health and status.
d. Maintains credential-driven user records and access history.
e. Supports network-connected credential readers and controlled doors.

f. Supports add-on software.
g. Supports video-surveillance system integration.
h. Provides email and text message alerts.

3. Options:

a. User Interface: Web browser and mobile app.
b. Number of Cardholders: Up to 1000.
c. Simultaneous Users: Five.

D. Access Control System Unit Antivirus and Security Protection Software:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Avast Software s.r.o.
b. McAfee, LLC.
c. Microsoft Corporation.
d. Or approved equal.

2.2 SOFTWARE FOR ACCESS CONTROL SYSTEM SUPPLEMENTARY COMPUTER EQUIPMENT

A. Description: This category covers software products for installation on access control system supplementary computer equipment that do not inhibit safety or intended operation of access control system hardware devices when they are shut off, lose power, or otherwise fail.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70 and NFPA 72, by qualified electrical testing laboratory and marked for intended location and application.

2. Listing Criteria:

a. Cybersecurity: UL CCN CYBR; including UL 2900-1 and UL 2900-2-3.

C. Access Control System Supplementary Computer Equipment Operating System Software:

1. Sole Source Product: Genetec Security Center

a. No Substitutions Permitted.

2. Additional Characteristics:

a. Provides event logging, notification, and escalation.
b. Provides threat-level management and response actions.
c. Provides dashboard view of system health and status.
d. Maintains credential-driven user records and access history.
e. Supports network-connected credential readers and controlled doors.
f. Supports add-on software.

g. Supports video-surveillance system integration.

D. Access Control System Supplementary Computer Equipment Antivirus and Security Protection Software:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Avast Software s.r.o.
b. McAfee, LLC.
c. Microsoft Corporation.
d. Or approved equal.

E. Credential Card Personalization Software:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CardLogix Corporation.
b. HID Global; ASSA ABLOY.
c. Schlage; Allegion.
d. Or approved equal.

2. Additional Characteristics:

a. Credential card design and data-entry customization.
b. Card data fields populated directly from internal or networked database.
c. User-defined privileges.
d. Quick filter for searching internal database.
e. Global find for searching all networked databases.
f. Customized reporting.

F. Credential Card Printer and Encoder Software:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CardLogix Corporation.
b. HID Global; ASSA ABLOY.
c. Schlage; Allegion.
d. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF ACCESS CONTROL SOFTWARE

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Installation of Access Control Software: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with requirements in guide information for UL CCN ALVY, UL CCN CYBR, and UL CCN UOJK.
2. Consult Commissioner for resolution of conflicting requirements.

C. Interfaces with Other Work:

1. Coordinate installation of new access control software with equipment and network conditions existing on current New York City system.
2. Coordinate with Section 281000 "Access Control" for physical and functional interfaces with access control system and for compliance with system-wide performance requirements.
3. Coordinate with Section 281400 "Access Control System Hardware" for products that require access control software specified in this Section for operation and compliance with system-wide performance requirements.
4. Coordinate with Section 284621.11 "Addressable Fire-Alarm Systems" for interfacing access control system inputs/outputs with fire-alarm system inputs/outputs.

D. Systems Integration:

1. System must integrate with video surveillance.

3.3 FIELD QUALITY CONTROL OF ACCESS CONTROL SOFTWARE

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Perform manufacturer's recommended tests and inspections.

C. Nonconforming Work:

1. Software will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective software and retest.

D. Collect, assemble, and submit test and inspection reports.

3.4 SYSTEM STARTUP

A. Perform startup service.

1. Complete software installation and startup checks in accordance with manufacturer's published instructions.

END OF SECTION 281300

SECTION 281400 - ACCESS CONTROL SYSTEM HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Access control system units.
2. Access control system power supplies and battery chargers.

B. Related Requirements:

1. Section 281000 "Access Control"

2. Section 281300 "Access Control Software and Database Management" for software required to run hardware specified in this Section.
3. Section 281500 "Integrated Access Control Hardware Devices" for access control field devices controlled by hardware specified in this Section.
4. Section 281513 "Access Control Credentials"

1.3 DEFINITIONS

A. DGP: Data gathering panel.

B. LAN: Local area network.

C. RAID: Redundant array of inexpensive disks; redundant array of independent disks.

D. RAM: Random-access memory.

E. WAN: Wide area network.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Access control system units.
2. Access control system power supplies and battery chargers.
3. Access control system supplementary computer equipment.

B. Shop Drawings:

1. Project general notes.
2. Hardware and equipment locations.
3. Block diagram and cable/conduit routing.
4. System communications details.
5. Hardware and equipment installation details.
6. Secondary power calculations.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Installation instructions for access control system servers.
2. Installation instructions for access control system DGPs.
3. Installation instructions for access control system input/output interface.
4. Installation instructions for access control system door controllers.
5. Installation instructions for access control system workstation.
6. Manufacturer's recommended testing and inspection procedure for operation of access control system servers, panels, input/output interfaces, door controllers, and workstations.
7. Installation instructions for access control system power supplies and battery chargers.
8. Manufacturer's recommended testing and inspection procedure for operation of access control system power supplies and battery chargers.
9. Installation instructions for access control system printers.
10. Manufacturer's recommended testing and inspection procedure for operation of access control system printers.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements".

PART 2 - PRODUCTS

2.1 ACCESS CONTROL SYSTEM UNITS

A. Description: This category covers head end units for access control systems, providing a means of regulating or controlling physical entry into an area, or access to or use of device by electrical, electronic, and/or mechanical means. Access control systems are investigated as complete configuration based upon manufacturer's specified system components. Access control systems are intended to comply with applicable life safety access and egress requirements.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70 and NFPA 72, by qualified electrical testing laboratory and marked for intended location and application.
b. Comply with NFPA 1, NFPA 730, NFPA 731, and ICC IBC.

2. Listing Criteria: UL CCN ALVY; including UL 294.

C. Access Control System Server:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cisco Systems, Inc.
b. Dell Technologies Inc.
c. International Business Machines Corp. (IBM).
d. Or approved equal.

2. Source Limitations: Obtain products from single manufacturer.
3. Additional Characteristics:

a. Ethernet port for connection to LAN/WAN.

4. Options:

a. Input Voltage: 120 V(ac).
b. Operating Temperature: 50 to 82 deg F.
c. Memory: 32 GB RAM.
d. Mounting: EIA/ECA-310 standard 19 inch rack mount.
e. Refer to access control software manufacturer for server requirements.

D. Access Control System Door Controllers:

1. Sole Source Manufacturer: Genetec
a. No Substitutions Permitted.

2. Additional Characteristics:

a. Data ports for connection to LAN and downstream controllers.
b. Integral terminal blocks for connection of inputs/outputs to field devices.
c. Controller Inputs:

1) Auxiliary input.
2) Door contact.
3) Request to exit.
4) Cabinet tamper.
5) Power monitor.

d. Controller Outputs:

1) Auxiliary output.
2) Door strike.
3) Door operators.
4) Credential readers.

3. Options:

a. Controller Communication: Ethernet.
b. Mounting: Cabinet mount.

E. Access Control System Input/Output Interface:

1. Sole Source Manufacturer: Genetec
a. No Substitutions Permitted.

2.2 ACCESS CONTROL SYSTEM POWER SUPPLIES AND BATTERY CHARGERS

A. Description: This category covers power supplies and battery chargers for access control system units, controllers, input/output interfaces, workstations, printers, and encoders.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70 and NFPA 72, by qualified electrical testing laboratory and marked for intended location and application.
b. Comply with NFPA 1, NFPA 730, NFPA 731, and ICC IBC.

2. Listing Criteria: UL CCN ALVY; including UL 294.

C. Access Control System Power Supply and Battery Charger:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. LifeSafety Power (LSP); ASSA ABLOY.

b. Altronix Corp.
c. Honeywell Commercial Security; Honeywell International, Inc.

d. Or approved equal.

2. Additional Characteristics:

a. Input Voltage: 120 V(ac).
b. Output Voltage: 12 to 24 V(dc).
c. Enclosure lock with tamper switch and monitoring.
d. Built-in battery charger.

2.3 ACCESS CONTROL SYSTEM SUPPLEMENTARY COMPUTER EQUIPMENT

A. Access Control System Workstation:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dell Technologies Inc.
b. HP Inc.
c. Lenovo Holding Co., Inc.; Lenovo Group Ltd.
d. Or approved equal.

2. Additional Characteristics:

a. Input Voltage: 120 V(ac).
b. Ethernet port for connection to LAN/WAN.
c. PC-based operating system with high-definition display.

3. Options:

a. Display Size: 27-inch.
b. Display Resolution: 1920×1080.
c. Drive Space: 1 TB.
d. Memory: 32 GB RAM.
e. User Control: keyboard and mouse.
f. Mounting: desktop mount.

4. Accessories:

a. Printer for identification/credential cards.
b. Encoder for programming of access control credentials.

B. Access Control System Printers and Encoders:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. HID Global; ASSA ABLOY.
b. Magicard Ltd.
c. Zebra Technologies Corp.
d. Or approved equal.

2. Additional Characteristics:

a. Password-protected access for secure printing.
b. Mounting: Desktop mounted.

3. Options:

a. Data Connection: Ethernet.
b. Printing Resolution: 300 dpi.
c. Access Control Credential Programming: Proximity smart card.

4. Accessories:

a. WiFi accessory for Ethernet-enabled printers.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION OF ACCESS CONTROL SYSTEM HARDWARE

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Installation of Access Control System Hardware and Wiring: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with requirements in guide information for UL CCN ALVY.
2. Consult Commissioner for resolution of conflicting requirements.

C. Interfaces with Other Work:

1. Coordinate with Section 281000 "Access Control" for physical and functional interfaces with access control system and for compliance with system-wide performance requirements.
2. Coordinate with Section 284621.11 "Addressable Fire-Alarm Systems" for interfacing security system inputs/outputs with fire-alarm system inputs/outputs.

D. Systems Integration:

1. Integration with video surveillance system and intrusion detection system.

3.3 FIELD QUALITY CONTROL OF ACCESS CONTROL SYSTEM HARDWARE

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Perform manufacturer's recommended tests and inspections.

C. Nonconforming Work:

1. Hardware and components will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Collect, assemble, and submit test and inspection reports.

3.4 SYSTEM STARTUP

A. Perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's published instructions.

3.5 ADJUSTING

A. Adjust printers and ribbons to function smoothly, and lubricate as recommended in writing by manufacturer.

3.6 PROTECTION

A. After installation, protect access control system hardware from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by the City of New York.

END OF SECTION 281400

SECTION 281500 - INTEGRATED ACCESS CONTROL HARDWARE DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Integrated credential readers and entry management.
2. Access control credentials.

B. Related Requirements:

1. Section 280010 "Supplemental Requirements for Electronic Safety and Security" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 281000 "Access Control".
3. Section 281513 "Access Control Credentials" for additional access control hardware credential products.
4. Section 281523 "Intercom Entry Systems" for access control intercom entry products.

1.3 DEFINITIONS

A. NFC: Near Field Communications.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. Integrated Credential Readers and Entry Management:

   a. Credential readers.

2. Access Control Credentials:

   a. Access control cards.

B. Shop Drawings:

1. Project general notes.
2. Device layout.
3. Block diagram and cable/conduit routing.
4. System communications details.
5. System mounting details.
6. Secondary power calculations.

C. Field quality-control reports.

1.6 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Installation instructions for integrated credential readers and entry management devices.
2. Manufacturer's recommended tests and inspections for integrated credential readers and entry management devices.
3. Printing, programming, and handling instructions for access control credentials.
4. Installation instructions for access control remote devices.
5. Manufacturer's recommended tests and inspections for access control remote devices.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 REGULATORY AGENCY APPROVALS FOR EGRESS MANAGEMENT DEVICES

A. Submittals for egress management devices requiring approval by The NYC Department of Buildings must be signed and sealed by qualified life safety professional engineer licensed in the State of New York responsible for their preparation that is retained by the Contractor. Obtain approval by The NYC Department of Buildings prior to submitting for action by Commissioner.

PART 2 - PRODUCTS

2.1 INTEGRATED CREDENTIAL READERS AND ENTRY MANAGEMENT

A. Proximity Reader for Card, Fob, or Smartphone:

1. Basis-of-Design Product: Subject to compliance with requirements, provide HID Global Signo Reader 40 and Signo Reader 20, or comparable product by one of the following:

a. IDenticard Systems; Precision Dynamics Corporation.
b. ZK TECO.
c. XceedID; an Allegion brand.
d. Or approved equal.

2. Options:

a. Read Range: Up to 3 inch.
b. Mounting Type: Wall mount and mullion mount.
c. Climate: Indoor and outdoor.
d. Size: Single gang.

2.2 ACCESS CONTROL CREDENTIALS

A. Access Control Cards:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. HID Global; ASSA ABLOY.
b. IDenticard Systems; Precision Dynamics Corporation.
c. IDTECK Global, Inc.
d. Or approved equal.

2. Performance Criteria:

a. Reference Standards:

1) Physical: IEC 7810, IEC 10373, and IEC 7816 for contact cards; and IEC 14443 for contactless cards.

b. Format: Customizable, including artwork. Provide credential template with provisions for the following:

1) On Front: Photograph, full name (surname first), affiliation, organization, card expiration date, color-coding, organization name and logo, two-dimensional bar code.
2) Stored Data Elements: PIN, employee ID number, digital signature private key and certificate, key management private key and certificate, and card authenticate data.

2.3 ELECTRIFIED LOCKING DEVICES AND ACCESSORIES

A. Request-to-Exit (REX) Motion Sensor:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ASSA ABLOY Electronic Security Hardware; ASSA ABLOY.
b. Honeywell Commercial Security; Honeywell International, Inc.
c. Vicon Industries, Inc.
d. Or approved equal.

B. Request-to-Exit (REX) Push Button:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ASSA ABLOY Electronic Security Hardware; ASSA ABLOY.

b. Schlage; an Allegion brand.
c. Von Duprin; an Allegion brand.
d. Or approved equal.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 DEPLOYMENT OF CREDENTIALS

A. Comply with manufacturer's published instructions.

B. Third-Party Issuing of Access Control Credentials:

1. Printing of New Credentials: Contractor must be capable of programming and issuing credentials compatible with City of New York's access control system.

a. Initial Issuance: Provide spreadsheet or form for collecting data for generation of credentials. The City of New York will submit completed form containing data for personnel to be issued credentials. Print and provide initial run, printed and programmed credentials in specified format within four weeks of request.
b. Ongoing Issuance: Produce additional credentials upon City of New York's request. The City of New York will submit completed form containing data for personnel to be issued credentials. Print and program credentials in specified format within two weeks of request.

3.3 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Special Techniques:

1. Cable Type: Shielded.
2. Analog Maximum Cable Length: 1000 ft.
3. Digital Maximum Cable Length: 500 ft.

C. Interfaces with Other Work:

1. Coordinate access control credentials with integrated credential readers and access control system architecture.
2. Egress Management Interfaces:

a. Coordinate with Section 282000 "Video Surveillance" for automatic video feed callup upon delayed egress activation.
b. Coordinate with Section 284621.11 "Addressable Fire-Alarm Systems" for monitoring of egress management device alarms by fire-alarm system.

3.4 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Perform manufacturer's recommended tests and inspections.

C. Nonconforming Work:

1. Device will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Collect, assemble, and submit test and inspection reports.

3.5 PROTECTION

A. After installation, protect integrated access control hardware devices from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by City of New York.

3.6 SERVICE AGREEMENT

A. Software and Firmware Service Agreement:

1. Technical Support: Beginning at Substantial Completion, verify that software and firmware service agreement includes software and firmware support for one year.
2. Upgrade Service: At Substantial Completion, update software and firmware to latest version. Install and program software and firmware upgrades that become available within one year from date of Substantial Completion. Verify that upgrading software includes operating system and new or revised licenses for using software.

   a. Upgrade Notice: No fewer than 30 days to allow City of New York to schedule and access the system and to upgrade computer equipment if necessary.

3. Upgrade Reports: Prepare report after each update, documenting upgrades installed.

END OF SECTION 281500

SECTION 281513 - ACCESS CONTROL CREDENTIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Access control cards.

B. Related Requirements:

1. Section 280010 "Supplemental Requirements for Electronic Safety and Security" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 281000 "Access Control".

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Access control cards.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official deployment and testing instructions issued to Contractor by manufacturer for the following:

1. Printing, programming, and handling instructions for access control credentials.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

PART 2 - PRODUCTS

2.1 ACCESS CONTROL CARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. HID Global; ASSA ABLOY.
2. IDenticard Systems; Precision Dynamics Corporation.
3. IDTECK Global, Inc.
4. Or approved equal.

B. Performance Criteria:

1. General Characteristics:

a. Reference Standards:

1) Physical: IEC 7810; IEC 10373; IEC 7816 for contact cards; and IEC 14443 for contactless cards.

b. Format: Customizable, including artwork. Provide credential template with provisions for the following:

1) On Front: Photograph, full name (surname first), affiliation, organization, card expiration date, color-coding, organization's name, and logo, two-dimensional bar code.

C. Options:

1. Transmit Frequency: 125 kHz and 13.56 MHz.
2. Operating Temperature: Minus 40 to plus 185 deg F.
3. Materials: PVC laminate.
4. Reading Medium: Proximity.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 DEPLOYMENT

A. Comply with manufacturer's published instructions.

B. Third-Party Issuing of Access Control Credentials:

1. Printing of New Credentials: Contractor must be capable of programming and issuing credentials compatible with The City of New York's access control system.

a. Initial Issuance: Provide spreadsheet or form for collecting data for generation of credentials. The Commissioner will submit completed form containing data for personnel to be issued credentials. Print and provide initial run, printed and programmed credentials in specified format within four weeks of request.
b. Ongoing Issuance: Produce additional credentials upon The Commissioner's request. The Commissioner will submit completed form containing data for personnel to be issued credentials. Print and program credentials in specified format within two weeks of request.

C. Interfaces with Other Work:

1. Coordinate access control credentials with integrated credential readers and access control system architecture.

END OF SECTION 281513

SECTION 281523 - INTERCOM ENTRY SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Digital audio-video intercom entry systems.

B. Related Requirements:

1. Section 280010 "Supplemental Requirements for Electronic Safety and Security" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Digital audio-video intercom entry systems.

B. Shop Drawings:

1. Project general notes.
2. Device layout.
3. Block diagram and cable/conduit routing.
4. System communications details.
5. System mounting details.
6. Secondary power calculations.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Installation and startup instructions for intercom entry systems.
2. Manufacturer's recommended tests and inspections for intercom entry systems.

B. Sample warranties.

1.6 CLOSEOUT SUBMITTALS

A. Warranty documentation.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Special Tools: Furnish to City of New York proprietary equipment, keys, and software required to operate, maintain, repair, adjust, or implement future changes to intercom entry system, that are packaged with protective covering for storage on-site and identified with labels describing contents.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 WARRANTY

A. Special Manufacturer Warranty: Manufacturer warrants that intercom entry system perform in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within warranty period.

1. Warranty Period: Three years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 DIGITAL AUDIO-VIDEO INTERCOM ENTRY SYSTEMS

A. Description: This category covers digital audio-video intercom entry systems, together with controls and accessories for use with such operators, and similar devices.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Aiphone Corporation IXG Series IX-MV7-HB Master Station and IX-DV/DVF Video Door Station, or comparable product by one of the following:

1. Enterphone: a brand of Indentiv, Inc.
2. Stentofon: a brand of Zenitel USA.

3. Sipelia Communications.
4. Or approved equal.

C. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory and marked for intended location and application.
2. Listing Criteria: UL CCN ALVY; including UL 294.

D. Options:

1. Operating Temperature: Minus 29 to plus 150 deg F.
2. Connectivity: Hardwired.
3. Finishes: Brushed stainless steel.
4. Climate: Indoor and outdoor.
5. Mounting: Devices must be wall or flat-sided post mounted.
6. Video Camera:

a. Display: 11 inch full-color.
b. Camera Field of View: 80 degrees horizontal, 60 degrees vertical, and 100 degrees diagonal.

E. Accessories:

1. Recessed back box.
2. External keypad.
3. Mounting adaptor plate.
4. Mullion mounting bracket.
5. Desk stand.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Interfaces with Other Work:

1. Coordinate installation of new products for intercom entry systems with existing City of New York system.

3.3 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by Commissioner.

B. Tests and Inspections:

1. Perform manufacturer's recommended tests and inspections.

C. Nonconforming Work:

1. System will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Collect, assemble, and submit test and inspection reports.

3.4 SYSTEM STARTUP

A. Perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's published instructions.

3.5 PROTECTION

A. After installation, protect intercom entry system from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Commissioner.

3.6 GUARANTY SERVICE

A. Guaranty Service Agreement:

1. Technical Support: Beginning at Substantial Completion, verify that guaranty service agreement includes software and firmware support for one year.
2. Upgrade Service: At Substantial Completion, update software and firmware to latest version. Install and program software and firmware upgrades that become available within one year from date of Substantial Completion. Verify that upgrading software includes operating system and new or revised licenses for using software.

   a. Upgrade Notice: No fewer than 30 days to allow City of New York to schedule and access the system and to upgrade computer equipment if necessary.

3. Upgrade Reports: Prepare report after each update, documenting upgrades installed.

END OF SECTION 281523

SECTION 282000 - VIDEO SURVEILLANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes a video surveillance system consisting of cameras, digital video recorder, data transmission wiring, and a control station with its associated equipment.

B. Related Requirements:

1. Section 281300 "Access Control System Software and Database Management" to integrate access control system interface and control.
2. Section 283100 "Intrusion Detection" to integrate video surveillance used for intrusion detection.

1.3 DEFINITIONS

A. AGC: Automatic gain control.

B. B/W: Black and white.

C. CCD: Charge-coupled device.

D. FTP: File transfer protocol.

E. IP: Internet protocol.

F. LAN: Local area network.

G. MPEG: Moving picture experts group.

H. NTSC: National Television System Committee.

I. PC: Personal computer.

J. PTZ: Pan-tilt-zoom.

K. RAID: Redundant array of independent disks.

L. TCP: Transmission control protocol - connects hosts on the Internet.

M. UPS: Uninterruptible power supply.

N. WAN: Wide area network.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include dimensions and data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For video surveillance. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes.
3. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.
4. UPS: Sizing calculations.
5. Wiring Diagrams: For power, signal, and control wiring.

C. Design Data: Include an equipment list consisting of every piece of equipment by model number, manufacturer, serial number, location, and date of original installation. Add pretesting record of each piece of equipment, listing name of person testing, date of test, set points of adjustments, name and description of the view of preset positions, description of alarms, and description of unit output responses to an alarm.

1.6 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Data: Certificates, for cameras, camera-supporting equipment, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

C. Product Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For cameras, power supplies, infrared illuminators, monitors, videotape recorders, digital video recorders, video switches, and control-station components to include in emergency, operation, and maintenance manuals. In addition to items as required by DDC General Conditions, include the following:

1. Lists of spare parts and replacement components recommended to be stored at the site for ready access.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.9 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Interior, Controlled Environment: System components, except central-station control unit, installed in air-conditioned interior environments will be rated for continuous operation in ambient temperatures of 36 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
2. Exterior Environment: System components installed in locations exposed to weather will be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg F dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph. Use NEMA 250, Type 4 enclosures.
3. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of cameras, equipment related to camera operation, and control-station equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

A. Video-signal format will comply with NTSC standard, composite interlaced video. Composite video-signal termination will be 75 ohms.

B. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor's entry connection to components.

C. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components will initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station, control-unit alarm display will identify tamper alarms and indicate locations.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Video surveillance system will withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NECA 1.

D. Comply with NFPA 70.

E. Electronic data exchange between video surveillance system with an access-control system will comply with SIA TVAC.

2.3 STANDARD CAMERAS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hanwha Vision.

2. AXIS Communications.

3. Bosch Security Systems, Inc.
4. Samsung Opto-Electronics.
5. Or approved equal.

B. Color Camera:

1. Comply with UL 639.
2. Sensitivity: Camera will provide usable images in low-light conditions, delivering an image at a scene illumination of 0.2 lux.
3. Sensitivity: Camera will deliver 1-V peak-to-peak video signal at the minimum specified light level. Illumination for the test will be with lamps rated at approximately 2200-K color temperature, and with camera AGC off.
4. IR Illumination for outdoor cameras.
5. Motion Detector: Built-in digital.
6. Resolution: Minimum 2 MP for indoor cameras and minimum 5 MP for outdoor cameras.

7. Vari-Focal Lens for C1, C2, and C4 camera types.
8. 180/360 degrees angle for C3 and C5 camera types.
9. Vandal resistant IK10-Rated.
10. Outdoor Cameras IP66-Rated.
11. Cameras must be ONVIF-Compliant, have Real Time Clock (RTC) and Network Time Protocol (NTP).
12. Compression: H.264, MPEG-4 and JPEG.

2.4 INFRARED ILLUMINATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bosch Security Systems, Inc.
2. Samsung.
3. Hanwha Vision.
4. AXIS Communications.
5. Or approved equal.

B. Description: Lighting fixtures that emit light only in the infrared spectrum, suitable for use with cameras indicated, for nighttime surveillance, without emitting visible light.

1. Field-Selectable Beam Patterns: Narrow, medium, and wide.

C. Area Coverage: Illumination to 150 feet in a narrow beam pattern.

D. Exterior housings will be suitable for same environmental conditions as the associated camera.

2.5 CAMERA-SUPPORTING EQUIPMENT

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bosch Security Systems, Inc.
2. Samsung.
3. Hanwha Vision.
4. AXIS Communication.
5. Or approved equal.

B. Mounting Brackets for Fixed Cameras: Type matched to items supported and mounting conditions. Include manual pan-and-tilt adjustment.

2.6 NETWORK VIDEO RECORDERS

A. Sole-Source Product: Genetec Omnicast

1. No Substitutions Permitted.

B. System must be compatible with the existing City of New York system.

C. External storage or internal 250-1, 500-GB hard disk drive.

1. Video and audio recording over TCP/IP network.
2. Video recording of MPEG-2 and MPEG-4 streams.
3. Duplex Operation: Simultaneous recording and playback.
4. Continuous and alarm-based recording.
5. Full-Featured Search Capabilities: Search based on camera, time, or date.
6. Automatic data replenishment to ensure recording even if network is down.
7. Digital certification by watermarking.
8. Camera recording on motion at 15 fps. Data retention of minimum 30 days.
9. Capable of adding external RAID storage up to 7000 GB for models with no internal storage.
10. Full integration with LAN, Intranet, or Internet through standard Web browser or video management software.
11. Integrated Web server FTP server functionality.
12. Supports up to 64 devices.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways and other elements for compliance with space allocations, installation tolerance, hazards to camera installation, and other conditions affecting installation.

B. Examine roughing-in for LAN, WAN, and IP network before device installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 WIRING

A. Comply with requirements in Section 270528 "Pathways for Communications Systems."

B. Wiring Method: Install cables in raceways unless otherwise indicated.

1. Except raceways are not required in accessible indoor ceiling spaces and attics.
2. Except raceways are not required in hollow gypsum board partitions.
3. Conceal raceways and wiring except in unfinished spaces.

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

D. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

E. For communication wiring, comply with the following:

1. Section 271513 "Communications Copper Horizontal Cabling."

F. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

3.4 VIDEO SURVEILLANCE SYSTEM INSTALLATION

A. Install cameras and infrared illuminators level and plumb.

B. Install cameras with 84-inch- minimum clear space below cameras and their mountings. Change type of mounting to achieve required clearance.

C. Set pan unit and pan-and-tilt unit stops to suit final camera position and to obtain the field of view required for camera. Connect all controls and alarms, and adjust.

D. Install power supplies and other auxiliary components at control stations unless otherwise indicated.

E. Install tamper switches on components indicated to receive tamper switches, arranged to detect unauthorized entry into system-component enclosures and mounted in self-protected, inconspicuous positions.

F. Avoid ground loops by making ground connections only at the control station.

1. For 12- and 24-V dc cameras, connect the coaxial cable shields only at the monitor end.

3.5 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
2. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Conduct tests at varying lighting levels, including day and night scenes as applicable. Prepare video-surveillance equipment for acceptance and operational testing as follows:

   a. Prepare equipment list described in "Informational Submittals" Article.
   b. Verify operation of auto-iris lenses.
   c. Set back-focus of fixed focal length lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Adjust until image is in focus with and without the filter.
   d. Set back-focus of zoom lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Additionally, set zoom to full wide angle and aim camera at an object 50 to 75 feet away. Adjust until image is in focus from full wide angle to full telephoto, with the filter in place.
   e. Set and name all preset positions; consult City of New York's personnel.
   f. Set sensitivity of motion detection.
   g. Connect and verify responses to alarms.

h. Verify operation of control-station equipment.

3. Test Schedule: Schedule tests after pretesting has been successfully completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days' notice of test schedule.
4. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.

B. Video surveillance system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Tasks will include, but are not limited to, the following:

1. Check cable connections.
2. Check proper operation of cameras and lenses. Verify operation of auto-iris lenses and adjust back-focus as needed.
3. Adjust all preset positions; consult City of New York's personnel.
4. Recommend changes to cameras, lenses, and associated equipment to improve City of New York's use of video surveillance system.
5. Provide a written report of adjustments and recommendations.

3.7 CLEANING

A. Clean installed items using methods and materials recommended in writing by manufacturer.

B. Clean video-surveillance-system components, including camera-housing windows, lenses, and monitor screens.

3.8 DEMONSTRATION

A. Instruct City of New York's personnel to adjust and operate video-surveillance equipment.

END OF SECTION 282000

SECTION 283100 - INTRUSION DETECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Intrusion detection with communication links to perform monitoring, alarm, and control functions.
2. Integration of other electronic and electrical systems and equipment.

B. Related Sections:

1. Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for power cabling between master control units and field-mounted devices and control units.
2. Section 271513 "Communications Copper Horizontal Cabling" for Category 5e, 6, and 7 horizontal (general use, riser-, and plenum-rated) cabling.
3. Section 281300 "Access Control System Software and Database Management" for applications, interfaces, and workstations.
4. Section 282000 "Video Surveillance" for CCTV cameras that are used as devices for video motion detection.

1.3 DEFINITIONS

A. CCTV: Closed-circuit television.

B. PIR: Passive infrared.

C. RFI: Radio-frequency interference.

D. UPS: Uninterruptible power supply.

E. Control Unit: System component that monitors inputs and controls outputs through various circuits.

F. Master Control Unit: System component that accepts inputs from other control units and may also perform control-unit functions. The unit has limited capacity for the number of protected zones and is installed at an unattended location or at a location where it is not the attendant's primary function to monitor the security system.

G. Monitoring Station: Facility that receives signals and has personnel in attendance at all times to respond to signals. A central station is a monitoring station that is listed.

H. Protected Zone: A protected premises or an area within a protected premises that is provided with means to prevent an unwanted event.

I. Standard Intruder: A person who weighs 100 lb or less and whose height is 60 inches or less; dressed in a long-sleeved shirt, slacks, and shoes unless environmental conditions at the site require protective clothing.

J. Standard-Intruder Movement: Any movement, such as walking, running, crawling, rolling, or jumping, of a "standard intruder" in a protected zone.

K. Systems Integration: The bringing together of components of several systems containing interacting components to achieve indicated functional operation of combined systems.

L. Zone. A defined area within a protected premises. It is a space or area for which an intrusion must be detected and uniquely identified. The sensor or group of sensors must then be assigned to perform the detection, and any interface equipment between sensors and communication must link to master control unit.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: Components for sensing, detecting, systems integration, and control, including dimensions and data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: Detail assemblies of standard components that are custom assembled for specific application on this Project.

1. Functional Block Diagram: Show single-line interconnections between components including interconnections between components specified in this Section and those furnished under other Sections. Indicate methods used to achieve systems integration. Indicate control, signal, and data communication paths and identify programmable logic controllers networks and control interface devices and media to be used. Describe characteristics of network and other data communication lines.

    a. Indicate methods used to achieve systems integration.
    b. Describe methods used to protect against power outages and transient voltages including types and ratings of isolation and surge suppression devices used in data, communication, signal, control, and ac and dc power circuits.

2. Site and Floor Plans: Indicate final outlet and device locations, routing of raceways, and cables inside and outside the building. Include room layout for master control-unit console, terminal cabinet, racks, and UPS.
3. System Wiring Diagrams: Include system diagrams unique to Project. Show connections for all devices, components, and auxiliary equipment. Include diagrams for equipment and for system with all terminals and interconnections identified.
4. Sensor detection patterns and adjustment ranges.

C. Samples for Verification: For each type of exposed finish required.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1. Anchor inspection reports documenting inspections of built-in and cast-in anchors.

B. Field Test Reports: Test plan and report defining all tests required to ensure that system meets technical, operational, and performance specifications within 60 days of date of Contract award.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For intrusion detection system to include in emergency, operation, and maintenance manuals. In addition to items as required per DDC General Conditions, include the following:

1. Data for each type of product, including features and operating sequences, both automatic and manual.
2. Master control-unit hardware and software data.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications:

1. An Installer who is trained and approved by manufacturer for installation of units required for this Project.

C. Intrusion Detection Systems Integrator Qualifications: An experienced intrusion detection equipment supplier who has completed systems integration work for installations similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

1.9 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Altitude: Sea level to 4000 feet.
2. Master Control Unit: Rated for continuous operation in an ambient of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.
3. Interior, Controlled Environment: System components, except master control unit, installed in air-conditioned interior environments will be rated for continuous operation in ambients of 36 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing.

4. Exterior Environment: System components installed in locations exposed to weather will be rated for continuous operation in ambients of minus 30 to plus 122 deg F dry bulb and 20 to 90 percent relative humidity, condensing. Comply with UL 294 and UL 639 for outdoor-use equipment. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of intrusion detection devices and equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FUNCTIONAL DESCRIPTION OF SYSTEM

A. Description: Hard-wired, modular, microprocessor-based controls, intrusion sensors and detection devices, and communication links to perform monitoring, alarm, and control functions.

B. Supervision: System components will be continuously monitored for normal, alarm, supervisory, and trouble conditions. Indicate deviations from normal conditions at any location in system. Indication includes identification of device or circuit in which deviation has occurred and whether deviation is an alarm or malfunction.

1. Alarm Signal: Display at master control unit and actuate audible and visual alarm devices.
2. Trouble Condition Signal: Distinct from other signals, indicating that system is not fully functional. Trouble signal will indicate system problems such as battery failure, open or shorted transmission line conductors, or control-unit failure.
3. Supervisory Condition Signal: Distinct from other signals, indicating an abnormal condition as specified for the particular device or control unit.

C. System Control: Master control unit will directly monitor intrusion detection units and connecting wiring.

D. System will automatically reboot program without error or loss of status or alarm data after any system disturbance.

E. Operator Commands:

1. Help with System Operation: Display all commands available to operator. Help command, followed by a specific command, will produce a short explanation of the purpose, use, and system reaction to that command.
2. Acknowledge Alarm: To indicate that alarm message has been observed by operator.
3. Place Protected Zone in Access: Disable all intrusion-alarm circuits of a specific protected zone. Tamper circuits may not be disabled by operator.
4. Place Protected Zone in Secure: Activate all intrusion-alarm circuits of a protected zone.
5. Protected Zone Test: Initiate operational test of a specific protected zone.
6. System Test: Initiate system-wide operational test.
7. Print reports.

F. Timed Control at Master Control Unit: Allow automatically timed "secure" and "access" functions of selected protected zones.

G. Automatic Control of Related Systems: Alarm or supervisory signals from certain intrusion detection devices control the following functions in related systems:

1. Switch signal to selected monitor from CCTV camera in vicinity of sensor signaling an alarm.

H. Printed Record of Events: Print a record of alarm, supervisory, and trouble events on system printer. Sort and report by protected zone, device, and function. When master control unit receives a signal, print a report of alarm, supervisory, or trouble condition. Report type of signal (alarm, supervisory, or trouble), protected zone description, date, and time of occurrence. Differentiate alarm signals from other indications. When system is reset, report reset event with the same information concerning device, location, date, and time. Commands will initiate the reporting of a list of current alarm, supervisory, and trouble conditions in system or a log of past events.

I. Programmed Secure-Access Control: System will be programmable to automatically change status of various combinations of protected zones between secure and access conditions at scheduled times. Status changes may be preset for repetitive, daily, and weekly; specially scheduled operations may be preset up to a year in advance. Manual secure-access control stations will override programmed settings.

J. Manual Secure-Access Control: Coded entries at manual stations will change status of associated protected zone between secure and access conditions.

2.2 SYSTEM COMPONENT REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Control Units, Devices, and Communications with Monitoring Station: Listed and labeled by a qualified testing agency for compliance with SIA CP-01.

C. FM Global Compliance: FM-Approved and -labeled intrusion detection devices and equipment.

D. Comply with NFPA 70.

E. Compatibility: Detection devices and their communication features, connecting wiring, and master control unit will be selected and configured with accessories for full compatibility with the following equipment:

1. Door hardware specified in Section 087100 "Door Hardware."
2. Elevators specified in Section 142400 "Hydraulic Elevators."
3. Access control system specified in Section 281300 "Access Control System Software and Database Management."
4. Fire alarm system specified in Section 284621.11 "Addressable Fire-Alarm Systems."
5. Video surveillance system specified in Section 282000 "Video Surveillance."

F. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor entry connection to components.

1. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Lines: Listed and labeled by a qualified testing agency for compliance with NFPA 731.

G. Intrusion Detection Units: Listed and labeled by a qualified testing agency for compliance with UL 639.

H. Interference Protection: Components will be unaffected by radiated RFI and electrical induction of 15 V/m over a frequency range of 10 to 10,000 MHz and conducted interference signals up to 0.25-V rms injected into power supply lines at 10 to 10,000 MHz.

I. Tamper Protection: Tamper switches on detection devices, control units, annunciators, pull boxes, junction boxes, cabinets, and other system components will initiate a tamper-alarm signal when unit is opened or partially disassembled and when entering conductors are cut or disconnected. Master control-unit alarm display will identify tamper alarms and indicate locations.

J. Self-Testing Devices: Automatically test themselves periodically, but not less than once per hour, to verify normal device functioning and alarm initiation capability. Devices transmit test failure to master control unit.

K. Antimasking Devices: Automatically check operation continuously or at intervals of a minute or less, and use signal-processing logic to detect blocking, masking, jamming, tampering, or other operational dysfunction. Devices transmit detection of operational dysfunction to master control unit as an alarm signal.

L. Addressable Devices: Transmitter and receivers will communicate unique device identification and status reports to master control unit.

M. Remote-Controlled Devices: Individually and remotely adjustable for sensitivity and individually monitored at master control unit for calibration, sensitivity, and alarm condition.

2.3 ENCLOSURES

A. Interior Sensors: Enclosures that protect against dust, falling dirt, and dripping noncorrosive liquids.

B. Interior Electronics: NEMA 250, Type 12.

C. Screw Covers: Where enclosures are readily accessible, secure with security fasteners of type appropriate for enclosure.

2.4 SECURE AND ACCESS DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bosch Security Systems, Inc.
2. Digital Security Controls Ltd.
3. Honeywell International Inc.
4. Or approved equal.

B. Keypad and Display Module: Arranged for entering and executing commands for system-status changes and for displaying system-status and command-related data.

2.5 DOOR AND WINDOW SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. GE Security, Inc.
2. Honeywell Security Products- Americas.
3. Bosch.
4. Or approved equal.

B. Description: Balanced-magnetic switch, complying with UL 634, installed on frame with integral overcurrent device to limit current to 80 percent of switch capacity. Bias magnet and minimum of two encapsulated reed switches will resist compromise from introduction of foreign magnetic fields.

C. Flush-Mounted Switches: Unobtrusive and flush with surface of door and window frame.

D. Overhead Door Switch: Balanced-magnetic type, listed for outdoor locations, and having door-mounted magnet and floor-mounted switch unit.

E. Remote Test: Simulate movement of actuating magnet from master control unit.

2.6 PIR SENSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Bosch Security Systems, Inc.
2. Digital Security Controls Ltd.
3. GE Security, Inc.
4. Honeywell International Inc.
5. Or approved equal.

B. Listed and labeled by a qualified testing agency for compliance with SIA PIR-01.

C. Description: Sensors detect intrusion by monitoring infrared wavelengths emitted from a human body within their protected zone and by being insensitive to general thermal variations.

1. Wall-Mounted Unit Detection Range: 125 percent of indicated distance for individual units and not less than 50 feet.
2. Ceiling-Mounted Unit Spot-Detection Pattern: Full 360-degree conical.

D. Device Performance:

1. Sensitivity: Adjustable pattern coverage to detect a change in temperature of 2 deg F or less, and standard-intruder movement within sensor's detection patterns at any speed between 0.3 to 7.5 fps across two adjacent segments of detector's field of view.
2. Test Indicator: LED test indicator that is not visible during normal operation. When visible, indicator will light when sensor detects an intruder. Locate test enabling switch under sensor housing cover.
3. Remote Test: When initiated by master control unit, start a test sequence for each detector element that simulates standard-intruder movement within sensor's detection patterns, causing an alarm.

2.7 DURESS-ALARM SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. GE Security, Inc.
2. Honeywell International Inc.
3. Visonic Inc.
4. Or approved equal.

B. Description: A switch with a shroud over the activating lever that allows an individual to covertly send a duress signal to master control unit, with no visible or audible indication when activated. Switch will lock in activated position until reset with a key.

1. Minimum Switch Rating: 50,000 operations.
2. Push Button: Finger activated, suitable for mounting on horizontal or vertical surface.

2.8 MASTER CONTROL UNIT

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bosch Security Systems, Inc.
2. Digital Security Controls Ltd.
3. Honeywell Security Products- Americas.
4. Or approved equal.

B. Description: Supervise sensors and detection subsystems and their connecting communication links, status control (secure or access) of sensors and detector subsystems, activation of alarms and supervisory and trouble signals, and other indicated functions.

1. System software and programs will be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
2. Include a real-time clock for time annotation of events on the event recorder and printer.
3. Addressable initiation devices that communicate device identity and status.
4. Control circuits for operation of mechanical equipment in response to an alarm.

C. Construction: Wall mounted, modular, with separate and independent alarm and supervisory system modules. Arrangements that require removal of field wiring for module replacement are unacceptable.

D. Comply with UL 1076.

E. Console Controls and Displays: Arranged for interface between human operator at master control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: LCD, three line(s) of 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

3. Control-Unit Network: Automatic communication of alarm, status changes, commands, and other communications required for system operation. Communication will return to normal after partial or total network interruption such as power loss or transient event. Total or partial signaling network failures will identify the failure and record the failure at the annunciator display and at the system printer.
4. Field Device Network: Communicate between the control unit and field devices of the system. Communications will consist of alarm, network status, and status and control of field-mounted processors. Each field-mounted device will be interrogated during each interrogation cycle.
5. Operator Controls: Manual switches and push-to-test buttons that do not require a key to operate. Prevent resetting of alarm, supervisory, or trouble signals while alarm or trouble condition persists. Include the following:

    a. Acknowledge alarm.
    b. Silence alarm.
    c. System reset.
    d. LED test.

6. Timing Unit: Solid state, programmable, 365 days.
7. Confirmation: Relays, contactors, and other control devices will have auxiliary contacts that provide confirmation signals to system for their on or off status. Software will interpret such signals, display equipment status, and initiate failure signals.
8. Alarm Indication: Audible signal sounds and an LED lights at master control unit identifying the protected zone originating the alarm.
9. Alarm activation sounds a siren.

F. Protected Zones: 16 alarm and supervisory zones as indicated, with capacity for expanding number of protected zones by a minimum of 25 percent.

G. Power Supply Circuits: Master control units will provide power for remote power-consuming detection devices. Circuit capacity will be adequate for at least a 25 percent increase in load.

H. UPS: UPS will be sized to provide a minimum of six hours of master control-unit operation.

I. Cabinet: Lockable, steel enclosure arranged so operations required for testing, normal operation, and maintenance are performed from front of enclosure. If more than a single cabinet is required to form a complete control unit, provide exactly matching modular enclosures. Accommodate all components and allow ample gutter space for field wiring. Identify each enclosure by an engraved, laminated, phenolic-resin nameplate. Lettering on enclosure nameplate will not be less than 1 inch high. Identify, with permanent labels, individual components and modules within cabinets.

J. Transmission to Monitoring Station: A communications device to automatically transmit alarm, supervisory, and trouble signals to the monitoring station, operating over a standard voice grade telephone leased line. Comply with UL 1635.

K. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print system reset event, including same information for device, location, date, and time. Commands initiate the printing of a list of existing alarm, supervisory, and trouble conditions in the system and a historical log of events.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of intrusion detection.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations of intrusion detection connections before intrusion detection installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of intrusion detection.

D. Inspect built-in and cast-in anchor installations, before installing intrusion detection, to verify that anchor installations comply with requirements. Prepare inspection reports.

1. Remove and replace anchors where inspections indicate that they do not comply with requirements. Reinspect after repairs or replacements are made.
2. Perform additional inspections to determine compliance of replaced or additional anchor installations. Prepare inspection reports.

E. For material whose orientation is critical for its performance as a ballistic barrier, verify installation orientation.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 SYSTEM INTEGRATION

A. Integrate intrusion detection system with the following systems and equipment:

1. Electronic door hardware.
2. Access control.
3. Fire-alarm system.
4. Video surveillance.

3.4 SYSTEM INSTALLATION

A. Comply with UL 681 and NFPA 731.

B. Equipment Mounting: Install master control unit on finished floor with tops of cabinets not more than 72 inches above the finished floor.

C. Install wall-mounted equipment, with tops of cabinets not more than 72 inches above the finished floor.

D. Security Fasteners: Where accessible to inmates, install intrusion detection components using security fasteners with head style appropriate for fabrication requirements, strength, and finish of adjacent materials except that a maximum of two different sets of tools will be required to operate security fasteners for Project.

3.5 WIRING INSTALLATION

A. Wiring Method: Cable, concealed in accessible ceilings, walls, and floors when possible.

B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

C. Wires and Cables:

1. Conductors: Size as recommended in writing by system manufacturer unless otherwise indicated.
2. 120-V Power Wiring: Install according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables" unless otherwise indicated.
3. Control and Signal Transmission Conductors: Install unshielded, twisted-pair cable unless otherwise indicated or if manufacturer recommends shielded cable, according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

E. Install power supplies and other auxiliary components for detection devices at control units unless otherwise indicated or required by manufacturer. Do not install such items near devices they serve.

F. Identify components with engraved, laminated-plastic or metal nameplate for master control unit and each terminal cabinet, mounted with corrosion-resistant screws.

3.6 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals.

B. Install instructions frame in a location visible from master control unit.

3.7 GROUNDING

A. Ground the master control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to master control unit.

B. Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

C. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding. Provide 5 -ohm ground. Measure, record, and report ground resistance.

D. Install grounding electrodes of type, size, location, and quantity indicated. Comply with installation requirements in Section 260526 "Grounding and Bonding for Communications Systems."

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections: Comply with provisions in NFPA 731, Ch. 9, "Testing and Inspections."

1. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
2. Test Methods: Intrusion detection systems and other systems and equipment that are associated with detection and accessory equipment will be tested according to Table "Test Methods" and Table "Test Methods of Initiating Devices."

D. Documentation: Comply with provisions in NFPA 731, Ch. 4, "Documentation."

E. Tag all equipment, stations, and other components for which tests have been satisfactorily completed.

3.9 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three visits to Project during other-than-normal occupancy hours for this purpose.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate the intrusion detection system. Comply with documentation provisions in NFPA 731, Ch. 4, "Documentation and User Instruction."

END OF SECTION 283100

SECTION 284621.11 - ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Addressable fire-alarm system.
2. Fire-alarm control unit (FACU).
3. Manual fire-alarm boxes.
4. System smoke detectors.
5. Duct smoke detectors.
6. Fire-alarm notification appliances.
7. Fire-alarm addressable interface devices.
8. Digital alarm communicator transmitters (DACTs).

B. Related Requirements:

1. Section 087100 "Door Hardware" for magnetic door holders that release in response to fire-alarm outputs.
2. Section 260519 "Low-Voltage Electrical Power Conductors and Cables" or Section 260523 "Control Voltage Electrical Power Cables" for cables and conductors for fire-alarm systems.

1.3 DEFINITIONS

A. DACT: Digital alarm communicator transmitter.

B. EMT: Electrical metallic tubing.

C. FACU: Fire-alarm control unit.

D. High-Performance Building: A building that integrates and optimizes on a life-cycle basis all major high-performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.

E. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the 2007 Energy Independence and Security Act (EISA).

F. PC: Personal computer.

G. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:

1. Control Voltage: Listed and labeled for use in remote-control, signaling, and power-limited circuits supplied by a Class 2 or Class 3 power supply having rated output not greater than 150 V and 5 A, allowing use of alternate wiring methods complying with NFPA 70, Article 725.
2. Low Voltage: Listed and labeled for use in circuits supplied by a Class 1 or other power supply having rated output not greater than 1000 V, requiring use of wiring methods complying with NFPA 70, Article 300, Part I.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures".

1.5 ACTION SUBMITTALS

A. Approved Permit Submittal: Submittals must be approved by the NYC Fire Department prior to submitting them to Commissioner.

B. Product Data: For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.
2. Include rated capacities, operating characteristics, and electrical characteristics.

C. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in "Documentation" section of "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, and details, including details of attachments to other Work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Annunciator panel details.
5. Detail assembly and support requirements.
6. Include voltage drop calculations for notification-appliance circuits.
7. Include battery-size calculations.
8. Include input/output matrix.
9. Include written statement from manufacturer that equipment and components have been tested as a system and comply with requirements in this Section and in NFPA 72.
10. Include performance parameters and installation details for each detector.
11. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
12. Provide control wiring diagrams for fire-alarm interface to HVAC; coordinate location of duct smoke detectors and access to them.

    a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
    b. Show field wiring and equipment required for HVAC unit shutdown on alarm.
    c. Locate detectors in accordance with manufacturer's written instructions.
    d. Show air-sampling detector pipe routing.

13. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Qualification Statements: For Installer.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to closeout requirements in DDC General Conditions, include the following and deliver copies to the NYC Department of Buildings:

a. Comply with "Records" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
b. Provide "Fire-Alarm and Emergency Communications System Record of Completion Documents" in accordance with "Completion Documents" Article in "Documentation" section of "Fundamentals" chapter in NFPA 72.
c. Complete wiring diagrams showing connections between devices and equipment. Each conductor must be numbered at every junction point with indication of origination and termination points.
d. Riser diagram.
e. Device addresses.
f. Record copy of site-specific software.
g. Provide "Inspection and Testing Form" in accordance with "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

1) Equipment tested.
2) Frequency of testing of installed components.
3) Frequency of inspection of installed components.
4) Requirements and recommendations related to results of maintenance.
5) Manufacturer's user training manuals. See TSI for NYC employees.

h. Manufacturer's required maintenance related to system warranty requirements.
i. Abbreviated operating instructions for mounting at FACU and each annunciator unit.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On USB media.
3. Device address list.
4. Printout of software application and graphic screens.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications:

1. Installer's personnel must be trained and certified by manufacturer for installation of units required for this Project.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail because of defects in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ADDRESSABLE FIRE-ALARM SYSTEM

A. Description:

1. Noncoded, UL-certified addressable system, with multiplexed signal transmission and horn-and-strobe notification for evacuation.

B. Performance Criteria:

1. Regulatory Requirements:

a. Fire-Alarm Components, Devices, and Accessories: Listed and labeled by a NRTL in accordance with NFPA 70 for use with selected fire-alarm system and marked for intended location and application.

2. General Characteristics:

a. Automatic sensitivity control of certain smoke detectors.
b. Fire-alarm signal initiation must be by one or more of the following devices and systems:

1) Manual stations.
2) Smoke detectors.
3) Duct smoke detectors.
4) Automatic sprinkler system water flow.
5) Fire standpipe system.

c. Fire-alarm signal must initiate the following actions:

1) Continuously operate alarm notification appliances.
2) Identify alarm and specific initiating device at FACU.

3) Transmit alarm signal to remote alarm receiving station.
4) Unlock electric door locks in designated egress paths.
5) Switch HVAC equipment controls to fire-alarm mode.
6) Close smoke dampers in air ducts of designated air-conditioning duct systems.
7) Recall elevators to primary or alternate recall floors.
8) Record events in system memory.
9) Record events by system printer.

d. Supervisory signal initiation must be by one or more of the following devices and actions:

1) Valve supervisory switch.
2) Independent fire-detection and -suppression systems.
3) Zones or individual devices have been disabled.
4) FACU has lost communication with network.

e. System trouble signal initiation must be by one or more of the following devices and actions:

1) Open circuits, shorts, and grounds in designated circuits.
2) Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3) Loss of communication with addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
4) Loss of primary power at FACU.
5) Ground or single break in internal circuits of FACU.
6) Abnormal ac voltage at FACU.
7) Break in standby battery circuitry.
8) Failure of battery charging.
9) Abnormal position of switch at FACU or annunciator.

f. System Supervisory Signal Actions:

1) Initiate notification appliances.
2) Identify specific device initiating event at FACU.
3) Record event on system printer.
4) After time delay of 200 seconds, transmit trouble or supervisory signal to remote alarm receiving station.
5) Transmit system status to building management system.
6) Display system status on graphic annunciator.

g. System Printer:

1) Printer must be listed and labeled as integral part of fire-alarm system.

h. Device Guards:

1) Description: Welded wire mesh of size and shape for smoke detector, and notification appliances or other device requiring protection.

a) Factory fabricated and furnished by device manufacturer.
b) Finish: Paint of color to match protected device.

i. Document Storage Box:

1) Description: Enclosure to accommodate standard 8-1/2-by-11 inch manuals and loose document records. Legend sheet will be permanently attached to door for system required documentation, key contacts, and system information. Provide two key ring holders with location to mount standard business cards for key contact personnel.
2) Material and Finish: 18-gauge cold-rolled steel; four mounting holes.
3) Color: Red powder-coat epoxy finish.
4) Labeling: Permanently screened with 1 inch high lettering "SYSTEM RECORD DOCUMENTS" with white indelible ink.
5) Security: Locked with 3/4 inch barrel lock. Provide solid 12 inch stainless steel piano hinge.

2.2 FIRE-ALARM CONTROL UNIT (FACU)

A. Basis-of-Design Product: Subject to compliance with requirements, provide Edwards EST4 Series System, or comparable product by one of the following:

1. Notifier
2. Simplex Grinnell
3. or approved equal.

B. Description: Field-programmable, microprocessor-based, modular, power-limited design with electronic modules.

C. Performance Criteria:

1. Regulatory Requirements: Comply with NFPA 72 and UL 864.
2. General Characteristics:

a. System software and programs must be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining information through failure of primary and secondary power supplies.
b. Include real-time clock for time annotation of events on event recorder and printer.
c. Provide communication between FACU and remote circuit interface panels, annunciators, and displays.
d. FACU must be listed for connection to central-station signaling system service.
e. Provide nonvolatile memory for system database, logic, and operating system and event history. System must require no manual input to initialize in the event of complete power down condition. FACU must provide minimum 500-event history log.
f. Addressable Initiation Device Circuits: FACU must indicate which communication zones have been silenced and must provide selective silencing of alarm notification appliance by building communication zone.

1) Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: FACU must be listed for releasing service.

g. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:

1) Pathway Class Designations: NFPA 72, Class B .

2) Pathway Survivability: Level 1.
3) Install no more than 50 addressable devices on each signaling-line circuit.
4) Install fault circuit isolators to comply with circuit performance requirements of NFPA 72 or with manufacturer's written instructions, whichever is more conservative.

h. Smoke-Alarm Verification:

1) Initiate audible and visible indication of "alarm-verification" signal at FACU.
2) Activate approved "alarm-verification" sequence at FACU and detector.
3) Record events by system printer.
4) Sound general alarm if alarm is verified.
5) Cancel FACU indication and system reset if alarm is not verified.

i. Notification-Appliance Circuit:

1) Audible appliances must sound in three-pulse temporal pattern, as defined in NFPA 72.
2) Where notification appliances provide signals to sleeping areas, alarm signal must be 520 Hz square wave with intensity 15 dB above average ambient sound level or 5 dB above maximum sound level, or at least 75 dB(A-weighted), whichever is greater, measured at pillow.
3) Visual alarm appliances must flash in synchronization where multiple appliances are in same field of view, as defined in NFPA 72.

j. Elevator Recall: Initiate by one of the following alarm-initiating devices:

1) Elevator lobby detectors except lobby detector on designated floor.
2) Smoke detectors in elevator machine room.

k. Elevator controller must be programmed to move cars to alternate recall floor if lobby detectors located on designated recall floors are activated.

l. Water-flow alarm connected to sprinkler in elevator shaft and elevator machine room must shut down elevators associated with location without time delay.

1) Water-flow switch associated with sprinkler in elevator pit may have delay to allow elevators to move to designated floor.

m. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls must be connected to fire-alarm system.

n. Indicate number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of central-control microphone. Amplifiers must comply with UL 1711.

1) Allow application of, and evacuation signal to, indicated number of zones and simultaneously allow voice paging to other zones selectively or in combination.
2) Programmable tone and message sequence selection.
3) Standard digitally recorded messages for "Evacuation" and "All Clear."
4) Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of FACU.

o. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from other printed indications. Also, print system reset event, including same information for device, location, date, and time. Commands initiate printing of list of existing alarm, supervisory, and trouble conditions in system and historical log of events.

p. Primary Power: 24 V(dc) obtained from 120 V(ac) service and power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory and DACT must be powered by 24 V(dc) source.

q. Alarm current draw of entire fire-alarm system must not exceed 80 percent of power-supply module rating.

r. Secondary Power: 24 V(dc) supply system with batteries, automatic battery charger, and automatic transfer switch.

s. Batteries: Sealed lead calcium.

D. Accessories:

1. Instructions: Computer printout or typewritten instruction card mounted behind plastic or glass cover in stainless steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe functional operation of system under normal, alarm, and trouble conditions.

2. Preaction System Functionality:

a. Initiate Presignal Alarm: This function must cause audible and visual alarm and indication to be provided at FACU. Activation of initiation device connected as part of preaction system must be annunciated at FACU only, without activation of general evacuation alarm.

2.3 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes must be finished in red with molded, raised-letter operating instructions in contrasting color; must show visible indication of operation; and must be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Double-action mechanism requiring two actions to initiate alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to FACU.
2. Station Reset: Key- or wrench-operated switch.
3. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at top to permit lifting for access to initiate alarm. Lifting cover actuates integral battery-powered audible horn intended to discourage false-alarm operation.
4. Material: Manual stations made of Lexan polycarbonate.

2.4 SYSTEM SMOKE DETECTORS

A. Photoelectric Smoke Detectors:

1. Performance Criteria:

a. Regulatory Requirements:

1) NFPA 72.
2) UL 268.

b. General Characteristics:

1) Detectors must be two-wire type.
2) Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
3) Base Mounting: Detector and associated electronic components must be mounted in twist-lock module that connects to fixed base. Provide terminals in fixed base for connection to building wiring.
4) Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
5) Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
6) Detector address must be accessible from FACU and must be able to identify detector's location within system and its sensitivity setting.
7) Operator at FACU, having designated access level, must be able to manually access the following for each detector:

a) Primary status.
b) Device type.
c) Present average value.
d) Present sensitivity selected.
e) Sensor range (normal, dirty, etc.).

8) Detector must have functional humidity range within 10 to 90 percent relative humidity.
9) Color: White.
10) Remote Control: Unless otherwise indicated, detectors must be digital-addressable type, individually monitored at FACU for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by FACU.
11) Multiple levels of detection sensitivity for each sensor.
12) Sensitivity levels based on time of day.

2.5 DUCT SMOKE DETECTORS

A. Description: Photoelectric-type, duct-mounted smoke detector.

B. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72.
b. UL 268A.

2. General Characteristics:

a. Detectors must be four -wire type.

b. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
c. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
d. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
e. Detector address must be accessible from FACU and must be able to identify detector's location within system and its sensitivity setting.
f. Operator at FACU, having designated access level, must be able to manually access the following for each detector:

1) Primary status.
2) Device type.
3) Present average value.
4) Present sensitivity selected.
5) Sensor range (normal, dirty, etc.).

g. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with supplied detector for smoke detection in HVAC system ducts.
h. Each sensor must have multiple levels of detection sensitivity.
i. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
j. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.6 FIRE-ALARM NOTIFICATION APPLIANCES

A. Fire-Alarm Audible Notification Appliances:

1. Description: Horns, bells, or other notification devices that cannot output voice messages.
2. Performance Criteria:

a. Regulatory Requirements:

1) NFPA 72.

b. General Characteristics:

1) Individually addressed, connected to signaling-line circuit, equipped for mounting as indicated, and with screw terminals for system connections.
2) Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.
3) Audible notification appliances must have functional humidity range of 10 to 95 percent relative humidity.
4) ISO Temporal 3 Evacuation Tone: 90 plus or minus 4 dB(A-weighted) at 24 V.
5) Combination Devices: Factory-integrated audible and visible devices in single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

B. Fire-Alarm Visible Notification Appliances:

1. Performance Criteria:

   a. Regulatory Requirements:

      1) NFPA 72.
      2) UL 1971.

   b. General Characteristics:

      1) Rated Light Output:

         a) As indicated on the drawings.

      2) Clear or nominal white polycarbonate lens mounted on aluminum faceplate.
      3) Mounting: Wall mounted unless otherwise indicated.
      4) For units with guards to prevent physical damage, light output ratings must be determined with guards in place.
      5) Flashing must be in temporal pattern, synchronized with other units.
      6) Strobe Leads: Factory connected to screw terminals.
      7) Mounting Faceplate: Factory finished, white.

2.7 FIRE-ALARM ADDRESSABLE INTERFACE DEVICES

A. Performance Criteria:

1. Regulatory Requirements:

   a. NFPA 72.

2. General Characteristics:

   a. Include address-setting means on module.
   b. Store internal identifying code for control panel use to identify module type.
   c. Listed for controlling HVAC fan motor controllers.
   d. Monitor Module: Microelectronic module providing system address for alarm-initiating devices for wired applications with normally open contacts.
   e. Integral Relay: Capable of providing direct signal to elevator controller to initiate elevator recall.

      1) Allow control panel to switch relay contacts on command.
      2) Have minimum of two normally open and two normally closed contacts available for field wiring.

   f. Control Module:

      1) Operate notification devices.
      2) Operate solenoids for use in sprinkler service.

2.8 DIGITAL ALARM COMMUNICATOR TRANSMITTERS (DACTs)

A. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72.

2. General Characteristics:

a. DACT must be acceptable to remote central station and must be listed for fire-alarm use.
b. Functional Performance: Unit must receive alarm, supervisory, or trouble signal from FACU and automatically capture two telephone line(s) and dial preset number for remote central station. When contact is made with central station(s), signals must be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter must initiate local trouble signal and transmit signal indicating loss of telephone line to remote alarm receiving station over remaining line. Transmitter must automatically report telephone service restoration to central station. If service is lost on both telephone lines, transmitter must initiate local trouble signal.
c. Local functions and display at DACT must include the following:

1) Verification that both telephone lines are available.
2) Programming device.
3) LED display.
4) Manual test report function and manual transmission clear indication.
5) Communications failure with central station or FACU.

d. Digital data transmission must include the following:

1) Address of alarm-initiating device.
2) Address of supervisory signal.
3) Address of trouble-initiating device.
4) Loss of ac supply.
5) Loss of power.
6) Low battery.
7) Abnormal test signal.
8) Communication bus failure.

e. Secondary Power: Integral rechargeable battery and automatic charger.
f. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Protection of In-Place Conditions: Protect devices during construction unless devices are placed in service to protect facility during construction.

3.4 INSTALLATION OF EQUIPMENT

A. Comply with NECA 305, NFPA 72, NFPA 101, and requirements the NYC Building Code for installation and testing of fire-alarm equipment. Install electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

1. Devices placed in service before other trades have completed cleanup must be replaced.
2. Devices installed, but not yet placed, in service must be protected from construction dust, debris, dirt, moisture, and damage in accordance with manufacturer's written storage instructions.

B. Equipment Floor and Wall Mounting: Install FACU on finished floor.

C. Install wall-mounted equipment, with tops of cabinets not more than 78 inch above finished floor.

D. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in normal path of egress within 60 inch of exit doorway.
2. Mount manual fire-alarm box on background of contrasting color.
3. Operable part of manual fire-alarm box must be between 42 and 48 inch above floor level. Devices must be mounted at same height unless otherwise indicated.

E. Smoke Spacing:

1. Comply with "Smoke-Sensing Fire Detectors" section in "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
2. Smooth ceiling spacing must not exceed 30 ft..
3. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas must be determined in accordance with Annex A or Annex B in NFPA 72.
4. HVAC: Locate detectors not closer than 36 inch from air-supply diffuser or return-air opening.
5. Lighting Fixtures: Locate detectors not closer than 12 inch from lighting fixture and not directly above pendant mounted or indirect lighting.

F. Install cover on each smoke detector that is not placed in service during construction. Cover must remain in place except during system testing. Remove cover prior to system turnover.

G. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend full width of duct. Tubes more than 36 inch long must be supported at both ends.

1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.

H. Remote Status and Alarm Indicators: Install in visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

I. Audible Alarm-Indicating Devices: Install not less than 6 inch below ceiling. Install bells and horns on flush-mounted back boxes with device-operating mechanism concealed behind grille. Install devices at same height unless otherwise indicated.

J. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inch below ceiling. Install devices at same height unless otherwise indicated.

K. Device Location-Indicating Lights: Locate in public space near device they monitor.

3.5 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate must be laminated acrylic or melamine plastic signs with black background and engraved white letters at least 1/2 inch high.

3.6 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Install nameplate for each control connection, indicating field control panel designation and I/O control designation feeding connection.

3.7 PATHWAYS

A. Pathways above recessed ceilings and in inaccessible locations may be routed exposed.

1. Exposed pathways must be installed in EMT.

3.8 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 087100 "Door Hardware." Connect hardware and devices to fire-alarm system.

1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.

B. Make addressable connections with supervised interface device to the following devices and systems. Install interface device less than 36 inch from device controlled. Make addressable confirmation connection when such feedback is available at device or system being controlled.

1. Smoke dampers in air ducts of designated HVAC duct systems.
2. Magnetically held-open doors.
3. Electronically locked doors and access gates.
4. Alarm-initiating connection to elevator recall system and components.
5. Supervisory connections at valve supervisory switches.

3.9 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Install framed instructions in location visible from FACU.

3.10 GROUNDING

A. Ground FACU and associated circuits in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

B. Ground shielded cables at control panel location only. Insulate shield at device location.

3.11 FIELD QUALITY CONTROL

A. Field tests are to be witnessed by the NYC Fire Department's inspectors and the Commissioner.

B. Administrant for Tests and Inspections:

1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.

C. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

a. Inspection must be based on completed record Drawings and system documentation that is required by "Completion Documents, Preparation" table in "Documentation" section of "Fundamentals" chapter in NFPA 72.
b. Comply with "Visual Inspection Frequencies" table in "Inspection" section of "Inspection, Testing and Maintenance" chapter in NFPA 72; retain "Initial/Reacceptance" column and list only installed components.

2. System Testing: Comply with "Test Methods" table in "Testing" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Test audible appliances for public operating mode in accordance with manufacturer's written instructions. Perform test using portable sound-level meter complying with Type 2 requirements in ASA S1.4 Part 1/IEC 61672-1.
4. Test audible appliances for private operating mode in accordance with manufacturer's written instructions.
5. Test visible appliances for public operating mode in accordance with manufacturer's written instructions.
6. Factory-authorized service representative must prepare "Fire Alarm System Record of Completion" in "Documentation" section of "Fundamentals" chapter in NFPA 72 and "Inspection and Testing Form" in "Records" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.

D. Reacceptance Testing: Perform reacceptance testing to verify proper operation of added or replaced devices and appliances.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.12 DEMONSTRATION

A. Engage a factory-authorized service representative to instruct City of New York's personnel to adjust and operate fire-alarm system. Provide video recording of instruction to City of New York.

3.13 GUARANTY SERVICE

A. Guaranty Service: Beginning at Substantial Completion, guaranty service must include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies must be manufacturer's authorized replacement parts and supplies.

1. Include visual inspections in accordance with "Visual Inspection Frequencies" table in "Testing" paragraph of "Inspection, Testing and Maintenance" chapter in NFPA 72.
2. Perform tests in "Test Methods" table in "Testing" paragraph of "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Perform tests per "Testing Frequencies" table in "Testing" paragraph of "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.14 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864.

B. Technical Support: Beginning at Substantial Completion, service agreement must include software support for one year.

C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within one year from date of Substantial Completion. Upgrading software must include operating system and new or revised licenses for using software.

1. Upgrade Notice: At least 30 days to allow City of New York to schedule access to system and to upgrade computer equipment if necessary.

END OF SECTION 284621.11

SECTION 310000 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Work of this Section includes, but is not limited to the following:

1. Provide labor, materials, equipment, and services necessary to complete the excavation, foundation construction, filling and grading as shown on the drawings and specified herein.
2. Removal of existing pavements, curbs, tanks, abandoned pipes, utilities, and former foundation structures, etc., designated for removal; relocation of fence and fence posts when necessary and other structures encountered or left by wreckers, old walls, rubble, etc.
3. Local excavation for the removal of obstructions identified within the alignment of excavation support systems including backfilling, grading, and compacting of said areas after removal of obstructions or other deleterious materials.
4. General excavation to levels established within the Contract Drawings and as described herein.
5. All excavation of earth, concrete, construction debris, uncontrolled fill, remnants of foundations, and other materials to the bottom of foundation subgrades, pits and slabs as required and indicated on drawings.
6. Local excavation for the footings, mats, slabs, walls, pile caps, and other foundation elements indicated on the drawings and as directed by the Commissioner.
7. Excavation, fill placement, grading, and compaction to required elevations for appurtenances and general site work as shown on the drawings and as directed herein.
8. Excavation and trenching for mechanical trades, including but not limited to all plumbing, heating, water, steam, gas, and electric within and outside the site as shown or required by the drawings or as required to make the work complete; backfilling same with clean fill as described hereinafter, and thoroughly compacting to "rough grading" elevations.
9. Excavation and trenching for temporary works as shown or as required; backfilling same with approved fill; compaction and rough grading. Removal of unsuitable soils, replacement with approved fill materials, and compaction as dictated by site conditions or as directed by the Commissioner.
10. Scarifying, compacting, controlling the moisture content of soils, and removal of unsuitable material to ensure proper preparation of areas to receive fill or proposed improvements.
11. Providing additional approved suitable material for filling and rough grading.
12. Legal off-site disposal of surplus excavated materials, and materials not suitable for re-use as fill or backfill. All earthwork handling and disposal must be in accordance with the Project's Waste Management Plan.
13. Subgrade preparation at footings, slabs, and other foundation elements.
14. Protection of adjacent structures, utilities, and pavements.
15. Temporary groundwater control as required for execution of the work under this section and for all other related foundation work in accordance with Section 312319, "Dewatering".

16. All professional engineering and consulting required for the design and execution of the work of this Section.
17. Other labor, equipment, and materials as may be reasonably inferred to be required to make the work under this section complete.

B. Related Requirements, Sections, and Documents:

1. Examine the Contract Drawings for requirements that directly affect or are affected by work under this Section. A list of those documents and sections include, but is not limited to the following:

   a. Section 033000 "Cast-in-Place Concrete"
   b. Section 312319 "Dewatering"
   c. Section 315000 "Excavation Support and Protection"
   d. Section 316216 "Steel Piles"

1.3 STANDARDS AND REFERENCES

A. General: Except as modified or voided by requirements specified herein or by details or notes included in the Contract Drawings, the Work specified under this Section must conform to all applicable provisions of the specifications, standards and other reference documents cited in this Specification and/or noted in the Contract Drawings.

B. Codes: All Work under this Section must conform to the most restrictive requirements of the New York City Building Code (2022 edition).

C. ASTM (American Society for Testing and Materials) Specifications, latest edition:

1.	ASTM C 33	Standard Specifications for Concrete Aggregates.
2.	ASTM D 422	Standard Test Method for Particle Size Analysis of Soils (sieve only).
3.	ASTM D 1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
4.	ASTM D 2216	Test Method for Laboratory Determination of Water (Moisture) Content of Rock and Soil.
5.	ASTM D 2487	Test Method for Classification of Soils for Engineering Purposes.
6.	ASTM D 2922	Standard Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth).
7.	ASTM D 3017	Test for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
8.	ASTM D 4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

D. ACI-318 - Building Code Requirements for Structural Concrete, latest edition.

E. ACI-299R - Controlled Low Strength Materials, latest edition.

F. The Contractor must meet NYCDEP Limitations for Effluent, NYSDEC and EPA limitations for discharge into any surface water bodies, federal EPA and State Department of Transportation regulations for shipping of regulated substances to off-site disposal facilities, and meet all regulatory requirements imposed by the Treatment, Storage, and Disposal Facility. Regulations pertaining to the handling, transport, and disposal of regulated substances/materials include, but are not limited to the following:

1. USEPA Regulation 40 CFR Part 280, Underground Storage Tanks: Technical Requirements Final Rule and Office of Emergency and Remedial Response, Standard Safety Guides, PB92-983414.
2. New York City Fire Department, FP Directive 3-73 Division of Fire Protection, NYCAC Title 27, New York City Fire Prevention Code, Chapter 4 et seq., and Rule 21-02 of the City of New York. NYS Uniform Fire Prevention and Building Code (UFPBC) 1164.5.
3. NYS Department of Environmental Conservation (DEC)-Subdivision 6 NYCRR Part 613.9 (b) (DEC's Petroleum Bulk Storage (PBS) Regulation.
4. NYSDEC Petroleum Bulk Storage Regulations 6 NYCRR Part 613.9(b).
5. 6 NYCRR Part 360, Solid Waste Management Facilities, July 14, 1985.
6. 6 NYCRR Part 364, Waster Transporter Permits, January 10, 1985.
7. 6 NYCRR Part 371, Identification and List of Hazardous Waste, July 1, 1986.
8. 6 NYCRR Part 375 Environmental Remedial Programs, December 14, 2006.
9. NYSDEC, Ambient Water Quality Standards and Guidance Values.
10. NYSDEC Site Assessment at Bulk Storage Facilities, August 1, 1994, SPOTS Memo No 14.
11. NYSDEC Petroleum-Contaminated Soil Guidance Policy, August 1992, STARS Memo No. 1.
12. Rule 21-02 of the City of New York.
13. The New York City Building Code (2022 edition).
14. 29 CFR 1910 - Federal Occupational Safety and Health Administration (OSHA) standards.
15. NIOSH Occupational Safety and Health Guidance manual for Hazardous Waste Site Activities.
16. 29 CFR 1926 - Federal Construction Standards.
17. Resource Conservation and Recovery Act, 40 CFR Parts 260-265, Safe Entry and Cleaning of Petroleum Storage Tanks.
18. National Fire Prevention Association, Volume 30, "Flammable and Combustible Liquids Code."
19. National Fire Prevention Association, Volume 327, "Cleaning or Safeguarding Small Tanks and Containers without Entry."
20. US Department of Transportation (US DOT) 49 CFR Section 172.500 et seq.
21. American Petroleum Institute, API-2015A, "A Guide for Controlling the Lead Hazard Associated with Tank Entry and Cleaning."
22. American Petroleum Institute, API-2217A, "Guidelines for Work in Inert Confined Spaces in the Petroleum Industry."
23. American Petroleum Institute, API-2015, "Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks."
24. American Petroleum Institute, API-2016, "Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks."
25. American Petroleum Institute, API-1604, "Closure of Underground Petroleum Storage Tanks."
26. American National Standard Institute, ANSI 22882, "Standard Practice for Respiratory Protection."
27. American Society of Testing Materials, ASTM D 5088, Decontamination of Field Equipment Used at Non-radioactive Waste Sites.
28. National Institute for Occupational Safety and Health, NIOSH, "Working in Confined Space."
29. Department of Transportation 49 CFR 172 through 179.
30. Department of Transportation 49 CFR 387 (46 FR 30974).
31. Department of Transportation DOT-E 8876.
32. Environmental Protection Agency 40 CFR 136 (41 FR 52779).

33. Environmental Protection Agency 40 CFR 262 and 761.
34. Resource Conservation and Recovery Act (RCRA).
35. NYCDEC, Rules of the City of New York (RCNY), Title 15, Chapter 19, Use of the Public Sewers.
36. NYCDEP, Limitations for Effluent to Sanitary or Combined Sewers.
37. NYCDEP, Dewatering Sampling and Testing Requirements.

G. Any transporter of contaminated/hazardous materials must be licensed in the state in which handling and transportation must take place.

H. Comply with OSHA (Occupational Safety and Health Administration) Standards and Regulations contained in Title 29 CFR Part 1910.120 "Hazardous Waste Operations and Emergency Response."

I. In case of conflict between regulations and specifications, the Contractor must comply with the most stringent requirements outlined in the specifications.

J. Nothing in this Article will relieve Contractor of their responsibility of providing a higher standard in order to comply with this Specification.

1.4 DEFINITIONS

A. Wherever the word "excavating", "excavate", "excavation", "carried down", "remove", etc., are used, they must be taken to include the removal of all existing work, including rubble, former foundation remnants, rubbish, earth, as well as rock, boulders, concrete and all other materials and obstructions encountered; they must also be taken to include all temporary excavation support, bracing, groundwater control, and all other operations and items needed for the proper execution of the Work. Excavation is considered unclassified.

B. Rock and boulders over one cubic yard in size which cannot be removed or dislodged without blasting or drilling must be classified as "rock excavation".

C. Where the words "finished grades", "finished grade lines", or "future finished grades", appear in these specifications, they must be taken to mean the finished elevations as indicated on the Contract Drawings.

D. Rough grading consists of cutting or filling to the elevation herein established with a permissible tolerance of plus or minus 1 inch. This tolerance must be used within any area of 100 square feet that it will not be necessary to remove excess or bring in additional fill to meet the required elevations.

E. Pre-excavation consists of excavation necessary to remove obstructions prior to installation of excavation support. Pre-excavation must include all necessary backfilling and compaction to provide a suitable working surface for slurry wall construction.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures".

1.6 ACTION SUBMITTALS

A. Test Reports: Submit the following information for each source of each material submitted for review and comment by the Commissioner:

1. Test reports on borrow material as follows:

    a. Particle size analysis in accordance with ASTM D 422 (sieve only)
    b. Atterberg Limits in accordance with ASTM D 4318
    c. Soil classification in accordance with ASTM D 2487
    d. Moisture content in accordance with ASTM D 2216
    e. Modified Compaction Curve in accordance with ASTM D 1557.

2. Include data for all samples indicating the exact location and methods of transportation and placement of all materials.
3. Include verification that borrowed material is not contaminated.

B. Plans and Shop Drawings: Submit detailed shop drawings and calculations to be reviewed by the Commissioner. The drawings and calculations must be prepared by a Professional Engineer licensed in the State of New York. The submittals must include but not limited to the following:

1. Earth excavation procedures.
2. Fill materials, equipment, and procedures for placement and methods of compaction, where required.
3. Backfilling and compacting material, equipment, and procedures.

C. Samples:

1. Where requested, the Contractor must submit samples of materials proposed for use as fill, including, but not limited to general fill, drainage fill, structural fill, pavement subbase course, etc. Samples must be submitted at least 1 week prior to proposed use on site. These reports as required under Section 1.6.A must accompany each sample.

D. Submit mix designs, vendor information, materials test data and reports, and any other pertinent product data for all proposed concrete fill including but not limited to: structural concrete, lean concrete, and controlled low strength materials (CLSM). All concrete fill mix designs must be prepared by a Professional Engineer licensed in the State of New York.

E. Catalog Cuts: Submit catalog cuts and manufacturer's literature for excavation and compaction equipment, and drainage materials.

F. All required certifications and permits pertaining to the work of this Section.

1.7 INFORMATIONAL SUBMITTALS

A. Monitoring Program: Monitoring must be per Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork".

B. Certification for Examination of Site and Records: Before proceeding with the Work, submit certification in an acceptable form, signed by the Contractor, stating that careful examination has been made of the site, existing structures, existing adjacent structures, records of utility lines, test boring records, soil samples, subsurface exploration reports, the Contract Drawings, and all other relevant documents.

1.8 FIELD CONDITIONS

A. Subsurface Conditions: The subsurface conditions within the development area are generally characterized by uncontrolled fill underlain by sand, silt, and finally bedrock. Groundwater was measured at a depth of about 12 to 16 feet below grade (about el 74.5 and 76 ft). Additional details pertaining to the subsurface conditions are presented in the Geotechnical Engineering Report. See Appendix.

B. Borings logs are available for the Contractor's review.

C. Soil samples taken from the borings are available for the Contractor's inspection from the boring inspector.

D. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with the City of New York and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner.

E. Interruption of Existing Utilities: Do not interrupt any utilities serving facilities occupied by City of New York or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Commissioner's written permission.

F. Where necessary, demolish and completely remove existing underground utilities indicated to be removed from the site. Coordinate with utility companies for shutoff of services if lines are active.

G. Examine the Contract Drawings to determine the sequence of operations, and relation to work of other trades. Start of work will signify acceptance of field conditions and will acknowledge coordination with other trades.

1.9 PROTECTION

A. The Work must be executed so that no damage or injury will occur to the existing public and adjacent structures, streets, paving, sewers, gas, water, electric or any other pipes. Should any damage caused by the Contractor, or anyone in Contractor's employ, or by the work under this section occur, the Contractor must, at their own expense, repair such damage.

B. The above must also include the protection of all existing utilities (including sewers, water lines, electrical lines and telecommunication lines) to remain in use within and adjacent to the area affected by the Work of this project.

C. Monuments, benchmarks and other reference features on streets bounding this project, must be protected. Should these be disturbed in any manner, replace them at no additional expense to the City of New York.

D. Excavation sides, adjacent structures, and foundations must be protected by means of adequate bracing, shoring, and anchoring at all times. Excavation must not proceed until adequate support for excavation sides is provided. Contractor is solely responsible for the stability, safety, and protection of excavation sides.

E. Provide barricades and warning lights and barriers to prevent accidents, to avoid all necessary hazards and protect the public, the Work, and property at all times, including Saturdays, Sundays, and Holidays.

F. Provide protection to sidewalks and pedestrians as required.

G. Erosion and Sediment Control and dust control must be in accordance with the Contractor's Site Management Plan.

H. Support of Excavation must be in accordance with Section 315000, "Excavation Support and Protection".

I. Monitoring must be in accordance with Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork".

J. The Contractor must maintain the cleanliness of paved streets immediately adjacent to the site through regular sweeping and moistening as required to remove any excess mud, dirt, or rocks tracked from the site. Materials must be covered with a tarpaulin during transport offsite.

1.10 ERRORS IN DEPTH

A. In the event that any part of the excavation is carried, through error, beyond the depth and the dimensions indicated on the Contract Drawings or called for in the specifications, then the Contractor, at their own expense, must furnish and install gravel, stone, or concrete fill with which to fill to the required level at all locations, subject to approval of the Commissioner.

1.11 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Materials and Work must conform to the latest edition of reference standards specified herein:

1. All work must comply with the requirements of the New York City Building Code (2022 edition), requirements of the New York State Department of Labor, requirements of Occupational Safety and Health Administration (OSHA), requirements of New York State Department of Health (NYSDOH), requirements of the New York State Department of Environmental Conservation (NYSDEC), requirements of the New York City Department of Environmental Protection (NYCDEP), requirements of the New York State Department of Transportation (NYSDOT), requirements of New York City Department of Transportation (NYCDOT).
2. The Contractor must procure and pay for all permits and licenses required to complete the Work of this Section.

1.12 QUALITY CONTROL

A. Special Inspection:

1. The City of New York will retain a Special Inspector.
2. Earthwork activities must be observed on a full-time basis, unless otherwise approved by the Commissioner.

B. The Contractor must cooperate fully with the Special Inspector(s) in the performance of their work.

C. Materials and installed work may require testing at any time as work progresses. Allow free access to material stockpiles and facilities.

D. Retesting of rejected materials and installed work must be Contractor's responsibility and must be performed at their expense.

E. The Contractor must notify the Commissioner and all other necessary parties at least 72 hours prior to each day of required inspection to allow for the appropriate personnel to be on site.

F. The role of the Special Inspector(s) will not relieve the Contractor from any responsibility with respect to conformance to the proper workmanship, management of materials and waste, or any other requirements of the Contract Drawings.

1.13 PRECONSTRUCTION MEETINGS

A. Preconstruction Conference: Before commencing Work of this Section, the Commissioner will arrange a series of meetings to discuss coordination and scheduling. Parties to be present: Testing Laboratory, Commissioner, Special Inspector(s), and any other parties deemed necessary by the Commissioner. Review the excavation and earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least three (3) working days prior to convening conference. Record discussions and agreements and furnish a copy of meeting minutes to each participant.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Site soils may be re-used provided they meet the project environmental criteria and the criteria provided in this Section.

B. Structural Fill: Well graded granular soil containing not more than 10 percent by weight of material finer than a No. 200 mesh sieve and not more than 20 percent retained on a ¾ inch sieve with a maximum particle size of 2 inches.

C. Drainage Fill: Clean ¾-inch gravel meeting the requirements of NYSDOT Item No. 605.0901, Underdrain Filter, Type I or AASHTO Gradation #57.

D. General Fill: must be no more than 20% by weight of stones or masonry debris, containing no stones or other materials greater than 4 inches in any dimension and contain less than 20% by weight materials finer than No. 200 mesh sieve.

E. Pavement Subbase Fill: Subbase materials below asphalt and concrete pavements must consist of clean granular soils, crushed stone, or recycled concrete aggregate conforming to the requirements of NYSDOT Item No. 304.14, Subbase Course, Type 4.

F. Fill for utility trenches must meet the criteria given for structural fill and must not contain sharp, angular pieces and pieces larger than 2 inches in any dimension.

G. Before bringing any fill to the site, the Contractor must submit the source for approval by the Commissioner.

H. All fill materials (structural, granular, and general fill) must be free from wood, debris, combustible materials, vegetable matter or any material subject to decay or disintegration. Fill material must not be contaminated.

I. The use of recycled concrete aggregate as structural or general fill must be permitted provided it meets the gradation requirements above and is deemed acceptable by the Commissioner.

J. The use of mole rock must not be permitted.

2.2 CONCRETE MATERIALS

A. Lean concrete must conform to ACI 301.

B. Controlled low strength material (CLSM) must conform to ACI 299R.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 GENERAL SITE PREPARATION

A. Notify the Commissioner before the start of work. The notifications are to be in accordance with the Contract Drawings.

B. The Contractor must furnish all labor, equipment and materials required to prepare site and to excavate all materials of whatever type encountered to the lines and grades shown on the Contract Drawings and as specified.

C. The Contractor must give 72 hours advance notice to the Commissioner and Special Inspector(s) of the impending completion of excavations so as to allow inspection of the exposed surface for footings, pile caps, slabs and pads and review the ground water conditions in accordance with the New York City Building Code (2022 edition) requirements for Special Inspection.

D. The Contractor is to obtain and pay for all necessary permits to perform the Work prior to start of such work.

E. Install all necessary protection equipment, structures such as fences, signs, scaffolding, etc. before the start of work.

F. Remove all existing structures, utilities, pavement in accordance with the Contract Drawings.

G. Protect all utility lines which are not to be abandoned. Contractor must be responsible for any damage to utilities that may occur.

H. Perform test pits alongside each of the adjacent buildings to determine the extent and depth of the below-grade space and the foundation type.

I. Stockpile on-site materials anticipated for re-use. Care must be taken to avoid blending with the deleterious materials. Stockpiling must comply with the requirements of the Contractor's Site Management Plan and any requirements set forth by the Commissioner.

3.3 GROUNDWATER AND SURFACE WATER CONTROL

A. Groundwater control must be in accordance with Section 312319, "Dewatering", and as specified herein.

B. The Contractor must assume the responsibility for site drainage and must maintain such drainage during the life of this contract in a manner so as not to adversely affect adjacent areas and structures.

C. The Contractor's groundwater control system must be capable of maintaining dry stable subgrade conditions.

D. Provide adequate pumps, or other equipment, appurtenances, power, drains, materials and labor necessary to excavation continuously dry during excavation, foundation construction, and backfilling and at such other times as the progress of the work may demand or as necessary to ensure safety to the structure must be provided. The Contractor must be responsible for maintaining groundwater levels at least 2 feet below the levels of any excavation.

E. All pumping both inside and outside the areas of the building must be performed, continued, and maintained as required for the completion of all Work, including the work of the mechanical trades. The Contractor must provide adequate backup systems in the event of equipment failure or malfunction.

F. Manage runoff to limit the impact on construction.

G. The dewatering system or systems must be installed and operated in such a manner as to avoid the movement of fines or loss of ground from below the bearing level and must not influence the stability of surrounding areas. The facilities needed to eliminate loss of ground must be included.

H. The Contractor's groundwater control system must consider methods and measures necessary to reduce inflow through soils, including but not limited to grouting and installation of sumps or pumping wells in an effort to minimize daily discharge quantities.

I. Do not use any portion of the building foundation units or any part thereof as a sump for drainage resulting from pumping in any other area. Do not conduct water to privately owned properties.

J. The Contractor's work must not result in damage to adjacent property. Protect adjacent property from the effects of groundwater lowering, as required.

K. Where required, the Contractor must be responsible for obtaining all necessary discharge permits.

L. The Contractor must be responsible for controlling surface water on site. Excavations must be protected from deleterious effects of surface water accumulation. The Contractor must grade accordingly to minimize run-off from entering and accumulating excavations.

3.4 GENERAL EXCAVATION

A. The excavation must be unclassified and must comprise and include the satisfactory removal and legal disposal of all materials encountered regardless of the nature of the materials and must be understood to include, boulders, earth, hardpan, miscellaneous fill, foundations, demolition debris from on-site buildings, structures, slabs, walls, utilities, pavements, curbs, piping and debris and must comply with the project environmental requirements.

B. All excavation must be properly sized and must extend to the depths of the form and size required for the installation of the work as indicated on the drawings. When excavations for foundation and site work have reached the required depths, the Special Inspector(s) must make an inspection of the conditions.

C. Excavation must be to required elevations for the bottom of the foundation, cut-and-fill, etc. Excavation must be made to a depth that will allow installation of the full depth of concrete slabs and any sub-base materials as shown on drawings with a 1-inch tolerance. Excavation lines must provide sufficient clearance for the proper execution of all concrete work including allowances for formwork, shoring, and inspection.

D. Materials that, in the opinion of the Commissioner, are not suitable for backfill, and any surplus earth, and all rock must be removed from the site and legally disposed of.

E. A 3-inch-thick concrete mud-slab must be required on all surfaces that will require horizontal waterproofing. All vertical surfaces to receive "blind-side" waterproofing must require a flat/rigid substrate. Where required, waterproofing must be installed in accordance with the drawings and specifications.

F. The bottom of excavations must be leveled off, free of standing water, snow, ice and loose materials, and graded to receive foundations, slabs, pits, trenches, and grade beams.

G. Subgrades must be level and free of loose soil, standing water and frost prior to acceptance for placement of concrete or fill. Hand-excavate to achieve final subgrade elevation as directed by the Commissioner.

3.5 EXCAVATION FOR BUILDING SLABS AND STRUCTURAL MEMBERS

A. Subgrades of building slabs and structural members including framed slabs, pile caps, grade beams, and other structural members must be approved by the Commissioner before proceeding with their construction. Subgrades resulting from excavation must be free of unsuitable material (fill, loose rock pieces, organics, debris, etc.) as judged by the Special Inspector(s). Bottoms of footings must be founded on materials suitable for achieving the bearing pressures indicated on the drawings and as approved by the Commissioner.

B. Subgrade Bearing Capacity: The subgrade bearing capacity must be as indicated on the Contract Drawings.

C. Unauthorized Excavation: Excavations performed below the elevations shown or specified, must be filled and compacted as hereinafter specified, at no additional expense to the City of New York.

D. Authorized Additional Excavation: Where the Commissioner determine that the bearing material encountered is unsuitable, remove the unsuitable bearing material. The removed material must be replaced with controlled fill or concrete as directed by the Commissioner.

3.6 GENERAL SUBGRADE PREPARATION

A. Proofrolling must be performed for all soil subgrades within and outside the limits of the proposed development including all adjacent site work and pavements.

B. All soil subgrades must be proofrolled in the presence of the Commissioner.

C. Proofrolling must be accomplished with a minimum of six (6) overlapping cross-rolled coverages of a smooth drum vibratory roller having a static weight of at least 8 tons or as approved by the Commissioner. A vibratory trench roller having a static weight of at least 1.5 tons must be utilized in confined areas as approved by the Commissioner. Areas inaccessible to the heavy equipment must be compacted using a vibratory plate or jumping jack compactor as directed by the Commissioner. The maximum travel speed of rollers should not exceed 1.5 mph.

D. Vibratory or impact compaction must not be performed on soils which are not within 2% of the optimum moisture content as determined by ASTM D 1557.

E. Fill must not be placed until the subgrade is approved by the Special Inspector(s).

F. Soft Areas during Compaction: Areas deemed unsatisfactory due to "pumping, rutting, or heaving" must be undercut within the limits and extent ordered by the Commissioner. These areas must be replaced with an approved fill, and compacted to the requirements of this Section or as directed by the Commissioner.

3.7 FILLING, GRADING, AND COMPACTING

A. Filling and backfilling must not be performed until work has been accepted by the Commissioner. All wood, paper, and other deleterious materials must be cleaned out from excavations before backfilling.

B. All subgrades must be free of water, snow, ice, wood, organics, or other deleterious materials prior to placement of any fill.

C. The filling or backfilling within the area of the building must be done so that there will be no void spaces below floors and bottoms of pits, trenches, pipe haunches, pavements, etc. unless otherwise noted.

D. Fill must not be placed against concrete elements until the concrete has obtained its specified compressive strength, unless otherwise directed by the Commissioner. Where fill is required on both sides of a wall, said fill must be brought up simultaneously and evenly on both sides.

E. Fill voids caused by the removal of boulders, and/or below grade improvements, with lean concrete, CLSM, or structural fill.

F. The Contractor must supply and install all fill materials necessary to bring the ground surfaces to the required levels as shown on the drawings and as necessary to make the work complete.

G. All surplus materials must be removed from the site and legally disposed of. Should additional material be required for the placing of backfill, other than material obtained from the site, the Contractor must obtain, deliver, and place accepted backfill material as required.

H. Fill Placement:

1. Begin placement of fill and backfill at the lowest section of the area. Spread material evenly by mechanical equipment or by manual means above the approved compacted subgrade in lifts not exceeding 12-inches for material compacted by heavy machinery and 4-inches for material compacted by light machinery or by hand tamping.
2. Build layers as horizontally as practical to prevent thickness of lift from exceeding that specified but provide with sufficient longitudinal and transverse slope to provide for runoff of surface water from every point.

I. Moisture Control: The moisture-density curve for the fill used must be supplied by the Contractor as a guide in controlling moisture to achieve the required degree of compaction. If, in the opinion of the Commissioner, fill material becomes too wet for the required compaction, the fill must be dried by a method approved by the Commissioner prior to commencing or continuing compaction operations. Likewise, if, in the opinion of the Commissioner, the fill material becomes too dry for the required compaction, the fill must be moistened by a method approved by the Commissioner prior to commencing or continuing compaction operations.

J. Compacting: Compact each layer of fill with the appropriate equipment listed below in this Article to achieve as a minimum the following percentages of maximum density at optimum moisture when tested in accordance with ASTM D 1557 (Modified Proctor Test):

LOCATION	% MAX. DENSITY
Footings, slabs-on-grade, pavement, and utilities	95
Pile Supported Structures, including framed slabs	92
Behind Foundation Walls	95

K. The degree of compaction must be checked by the Commissioner and each successive lift must not be placed or compacted until the previous lift is inspected and approved by the Commissioner. Compact all fill to elevations and limits shown on Contract Drawings.

L. Backfilling against Foundation Walls: After completion of foundation walls and removal of forms, clean the excavation of all trash and debris before application of waterproofing and/or vapor barrier and placement of backfill.

M. Frost: Do not place fill materials when either the fill materials or the previous lift (or subgrade) on which it is placed is frozen. In the event that any fill which has already been placed on the surface must become frozen, it must be scarified and recompacted, or removed, to the approval of the Special Inspector(s) before the next lift is placed. Remove or recompact any soft spots resulting from frost to the satisfaction of the Special Inspector before new fill is placed.

N. Do not backfill against foundation or basement walls until completion of supporting floor construction to the top of backfill or first level above the top of backfill, unless adequate temporary shoring is provided.

O. If Contractor elects to backfill against foundation or basement walls before completion of supporting floor slabs, these walls must be shored. Temporary shoring must be designed by a Professional Engineer licensed in the State of New York, retained by the Contractor. Shoring design and calculations must be submitted to the Commissioner for review and approval.

P. In placing backfill, take special care to prevent wedge action, eccentric loading or overloading of the structure by equipment used for compacting backfill material, and to prevent damage to waterproofing on walls. Where subsoil drainage systems are installed, place backfill to prevent any damage to the systems. Any damage to waterproofing or drainage systems caused by backfilling or excavation operations must be corrected or replaced by the Contractor at their own expense.

Q. Additional backfilling required to bring fill to the finished subgrades shown must be done by the Contractor only after the concrete walls or piers, against which the backfilling is done, have attained their full design strength, have been braced, and the written permission to backfill is obtained from the Commissioner. If fill is required on both sides of a wall, it must be brought up simultaneously and evenly on both sides.

R. Do all filling necessary to bring the ground surfaces to the required levels for floors, pits, and areaways as shown on the drawings.

3.8 PROTECTION

A. Finished subgrades must be verified to ensure proper elevation and conditions for construction above subgrade.

B. Protect subgrade from excessive wheel loading during construction, including concrete trucks and dump trucks.

C. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

D. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

E. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

F. Where settling is measurable or observable at excavated areas during general project guarantee period, remove surface (pavement, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.9 FIELD QUALITY CONTROL

A. The Commissioner will review all laboratory test results and submitted reports specified in this Section.

B. The Commissioner will interpret the tests, state in each report whether or not the test specimens and results comply with all requirements of the Contract Drawings, and note any deviations.

C. The Commissioner will identify when and where samples are to be obtained for testing.

D. The Contractor must collect samples and forward them to a Testing Laboratory. Testing Laboratory will submit the following laboratory test reports to the Commissioner:

1. Laboratory results conducted on each type of borrow and fill material:

a. Gradation Analysis - ASTM D 422
b. Atterberg Limits - ASTM D 4318
c. Modified Moisture Density Curve Determination - ASTM D 1557

2. The Commissioner will review for conformance of materials to be used for fills, based on the gradations given in these specifications.

E. Engineering Inspection:

1. All engineering inspections must comply with the requirements of the New York City Building Code (2022 edition).
2. Building Slab and Footing Subgrades: The Special Inspector(s) will inspect subgrades for all building slabs and footing elements. No pavement, slab, or footing must be constructed unless the subgrade is approved by the Special Inspector(s).
3. Proofrolling: Proofrolling operations will be inspected by the Special Inspector(s).
4. Backfilling and Compaction: Backfilling and compaction below foundations, slabs, behind foundation walls, and any other backfilling and compaction work will be inspected by the Special Inspector(s). No fill will be placed unless the previous lift is approved by the Special Inspector(s). The Special Inspector(s) must take field density tests of the subgrade for every 1,000 square feet, but not less than 3 tests in each compacted fill layer. Field density tests must be performed in accordance with ASTM D 2922.

3.10 CLEAN-UP

A. All excess material including, earth, rock, fill, must be removed from the site and legally disposed of in accordance with the DDC General Conditions.

B. All lumber, forms and metalwork must be removed immediately after completion of local areas. Remove all debris produced by Work of this Section from the site.

C. Sidewalk and streets adjoining the property must be broom cleaned and free of debris, rubbish, trash and obstructions of any kind caused by the Work of this Section.

D. The removal and disposal must be in accordance with project environmental requirements.

3.11 CLOSEOUT

A. Substantial Completion Requirements:

1. Provide final cleaning immediately prior to Substantial Completion inspection.
2. Corrective Work: Remove, repair, and reinstall, or restore in place damaged items. Replace damaged materials or items with new if repair not acceptable to the Commissioner.
3. Provide product data to complete Operation & Maintenance Manuals.

3.12 WASTE MANAGEMENT

A. Separate and dispose of waste in accordance with the Project's Waste Management Plan.

END OF SECTION 310000

SECTION 310900 - GEOTECHNICAL INSTRUMENTATION AND MONITORING OF EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract".

1.2 SUMMARY

A. Section includes all labor, materials, equipment, and accessories necessary for the completion of all monitoring work as shown on the Contract Drawings, as specified herein, and as required by the conditions at the site.

B. The work of this Section includes, but is not limited to the following:

1. All labor, equipment, materials, and accessories necessary to execute the work of this Section as specified herein.
2. Collection, cataloging, and compilation of the existing adjacent buildings, infrastructure, and other structures to remain within 100 feet (horizontally) of the work limits (i.e., Pre-Construction Conditions Documentation).
3. Furnish and install optical survey targets, surveying marks, seismographs, benchmarks, settlement monitoring points, inclinometers, extensometers, and pressure cells, as required and as outlined herein.
4. Furnish all equipment and labor to provide continuous vibration monitoring within adjacent structures.
5. Provide all engineering services required to develop and prepare a monitoring plan meeting the minimum requirements outlined herein and as indicated on the Contract Drawings.
6. Provide all surveying services required for performing optical survey monitoring on the adjacent structures as outlined herein.
7. Provide all labor necessary for the periodic measurement of any installed crack gauges installed under this Section.
8. Compilation and transmittal of monitoring and instrumentation data during construction.
9. Provide all other labor, equipment, and materials as can reasonably be inferred to make the Work of this Section complete.

C. Related Requirements:

1. Work governed by this Section, as shown or specified must be in accordance with the requirements of the Contract Drawings and the New York City Building Code (2022 edition).
2. Work of this Section, as shown or specified, must be in accordance with the Support of Excavation drawings.
3. Examine the Contract Drawings for requirements that directly affect or are affected by work under this Section. A list of those documents and sections include, but is not limited to the following:

a. Section 033000 "Cast-in-Place Concrete"

b. Section 310000 "Earthwork"
c. Section 312319 "Dewatering"
d. Section 315000 "Excavation Support and Protection"
e. Section 316216 "Steel Piles"

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions, Section 013300 "Submittal Procedures".

1.4 ACTION SUBMITTALS

A. Submit method statement describing the type of equipment to be implemented for optical surveying, extensometers, pressure cells, crack gauges, and any other instrumentation proposed. Describe installation, location, operation, and maintenance of equipment, as necessary.

B. Submit work plan detailing the installation, operation, and maintenance of all equipment.

C. Submit product cut-sheets and calibration data and identify the allowable tolerances of all proposed equipment.

1.5 INFORMATIONAL SUBMITTALS

A. Submit Pre-Construction and Post-Construction Documentation Reports to the Commissioner for distribution. Documentation must include all applicable plans, sketches, notes, and photographs logging the conditions of all structures and thoroughfares located within 100 feet of the work limits.

B. Submit as-built plan showing location of all instrumentation and crack gauges installed to document movements during construction activities.

C. Monitoring Plans:

1. The Contractor must develop and prepare a monitoring plan meeting the minimum requirements outlined herein and as shown on the Contract Drawings.
2. The Contractor must submit drawings showing proposed monitoring points. The drawings must, at a minimum, include a plan view layout with appropriate elevation of all instrumentation and monitoring locations. The plans must additionally include all section and elevation views necessary to accurately convey the locations of monitoring points. The plan must graphically identify the type of monitoring point (i.e., optical survey, surface points, seismographs, crack gauges, borehole instruments, benchmarks, etc.), with each monitoring point bearing a unique identification number. Where required, provide elevation and section drawings (i.e., excavation faces, building facades, tunnel walls, etc.) and identify the elevations (North American Vertical of 1988 Datum NAVD88) at which monitoring points have been or will be installed.
3. The drawings must be updated and resubmitted in the event that monitoring points are abandoned, relocated, or additional monitoring points are added.

D. Submit sample survey monitoring report for approval by the Commissioner. Monitoring data must be provided showing cumulative moment both graphically and in tabular format as referenced to a baseline measurement. Dates and time must be provided for all monitoring intervals.

E. Submit all monitoring data directly to the Commissioner. Measurement data must be submitted within 24 hours of taking each reading. All data must be transmitted in electronic format suitable to the Commissioner. Transmitted data must show all cumulative measurements recorded as a function of time. Requisite notes must be included to document construction activities performed during the monitoring increment.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions, Section 014000 "Quality Requirements".

B. The Contractor must retain the services of a Land Surveyor, licensed in the State of New York, to perform all survey monitoring during construction.

C. The Contractor must retain the services of a qualified Professional Engineer, licensed in the State of New York, to evaluate and report all monitoring data during construction.

D. Codes and Permits:

1. Comply with the New York City Building Code (2022 edition).
2. All labor, materials, equipment, and services necessary to make the work comply with such requirements must be provided without additional cost to the City of New York.
3. The Contractor must procure and pay for all permits and licenses required to complete the work of this Section.

1.7 SCHEDULING OF WORK

A. Pre-Construction Conditions Documentation of all below grade structures and other adjacent structures must be completed at least 10 days, but no more than 60 days, prior to commencing earthwork and foundation construction, including but not limited to general earthwork, support of excavation installation, or other foundation or support of excavation related construction.

B. Locations for crack gauges must be determined during performance of the Pre-Construction Conditions Documentation. Crack gauges must be installed as required to catalog and record the conditions of existing cracks.

C. Seismographs must be installed during or following performance of Pre-Construction Conditions Documentation. Seismographs must be installed to allow for sufficient time to evaluate background vibration levels.

D. Additional crack gauges or seismographs must be installed as required by earthwork and foundation construction activities.

E. Survey targets, benchmarks, and settlement monitoring points must be installed at least 10 days prior to commencing with earthwork and foundation construction, including but not limited to general earthwork, installation of support of excavation, or other foundation or support of excavation related construction.

F. Additional monitoring points must be established as required during construction.

1.8 GENERAL MONITORING

A. General monitoring must include but not be limited to measurement of construction induced vibrations, vertical and lateral deflection of structures and utilities, inclination, soil/ground movement, and crack movement. Monitoring must be performed prior to and during earthwork and foundation construction to evaluate the performance of the Contractor's activities.

B. The field locations for all monitoring devices must be coordinated with the Commissioner.

C. The Contractor must be responsible for all maintenance of equipment as required to maintain monitoring on a continuous basis throughout the duration of earthwork and foundation construction activities.

D. All general monitoring data must be transmitted to the Commissioner.

1.9 VIBRATION AND CRACK MONITORING

A. Monitoring must include construction vibrations and periodic measurement of existing cracks, where present. Monitoring must be performed prior to and during earthwork and construction to evaluate the performance of the Contractor's activities.

B. The field locations of seismographs must be coordinated with the Commissioner.

C. The Contractor must be responsible for all maintenance of equipment as required to maintain monitoring on a continuous basis throughout the duration of construction activities on site.

D. Crack monitoring and vibration monitoring data must be transmitted to the Commissioner..

1.10 SURVEY MONITORING

A. Survey monitoring must include installation of survey monitoring points and periodic measurement of horizontal and vertical movements. The final location of survey monitoring points must be established by the Contractor, but at a minimum must include all areas identified on the Contract Drawings.

B. Survey monitoring data must be transmitted to the Commissioner.

1.11 ADDITIONS

A. The Contractor may elect to provide additional types of monitoring not specifically outlined herein, but must at a minimum conform to the requirements of this Section. Where additional types of monitoring are proposed, the Contractor must inform the Commissioner in writing, and must provide all information as requested by the Commissioner.

B. The Contractor must be solely responsible for all means and methods not specifically addressed herein.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. The Contractor must submit all details and other supporting data for materials proposed for use in performing the Work of this Section.

B. Optical Survey Targets: Survey targets must consist of self-adhesive reflective sheet targets suitable for adherence to wood, steel, brick, concrete, etc.

C. Surface Marker 1 (SM1): A ¼-inch by 2-inch PK nail set in paved streets or sidewalks with a 1-½" diameter hub identification tag.

D. Surface Marker 2 (SM 2): Scribe surface of monitoring point as required to maintain permanent demarcation of the location. Scribed locations must be identified on all drawings.

E. Seismographs: Seismographs must include a cellular modem or other means to allow for continuous real-time monitoring and alert via email and internet. Geophones and cases must be affixed to the liner walls or other structures by means of concrete anchor bolts. Portable units, mounted directly on the ground, must be installed in accordance with the manufacturer's requirements.

F. Crack Gauges: Provide grid crack gauges and anchors, bolts, screws and quick setting epoxy. A minimum of 10 gauges must be procured prior to execution of the Pre-Construction Conditions Documentation.

G. Optical Survey Equipment: Optical surveying equipment must be suitable for achieving the following accuracies and repeatability:

1. Vertical: at least plus or minus 0.005 ft
2. Horizontal: at least plus or minus 0.005 ft

H. Groundwater Observation Wells: Groundwater wells must be constructed using a minimum 10 foot section of slotted screen, and a minimum 10 foot section of solid riser consisting of 2-inch diameter, Schedule 40 PVC. The annulus must be backfilled with No. 1 filter sand to a minimum of 1 foot above the top of the slotted screen. The annulus above the filter sand must be sealed using a bentonite holeplug, 3/8-inch coarse grade Wyoming sodium bentonite. A steel flush mount cap must be placed at the ground surface.

I. All proposed materials and equipment must be submitted to the Commissioner for review and approval prior to procurement or delivery to the site.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 GENERAL INSTALLATION

A. Install monitoring systems prior to commencing construction activities.

B. Install all equipment in accordance with the manufacturer's recommendations.

C. Submit drawings showing the as-built locations for all monitoring points installed, listing unique identifiers for each point, and the type of monitoring.

D. Install additional monitoring points as required as the work progresses. Replace all locations that are lost, damaged, or vandalized.

E. Monitoring equipment must be installed in accordance with the manufacturer's recommendation and the Contractor's work plan.

3.3 INSTALLATION OF CRACK GAUGES

A. Cracks must be photographed and mapped prior to installation of crack gauges. The location of crack gauges must be made in consultation with the Commissioner.

B. Installation must be in accordance with the manufacturer's recommendations.

C. Write ID # on gauge with permanent marker.

D. After completion of installation, check that gauge parts are free to move over each other by passing a feeler gauge or thin plastic card between the two sections.

E. After completion of installation, the as-built location and initial movement (if any) must be recorded.

F. Photograph crack gauge following installation and all subsequent readings.

3.4 MONITORING LOCATIONS

A. The minimum number of locations and approximate orientation of all monitoring points must be shown on the Contract Drawings and as outlined below:

1. Buildings and Structures adjoining the proposed construction:

a. Survey Targets or Survey Marks: Monitoring locations must be evenly spaced at 25 foot centers at the base and roofline of adjacent structures to determine movement in critical areas such as cracked facades, etc.
b. Seismographs: Install seismographs as shown on the Contract Drawings, or as directed by the Commissioner.
c. Crack Gauges: Gauges must be installed at cracks observed during execution of the Preconstruction Conditions Documentation and as required as the work progresses, as determined by the Contractor, and as directed by the Commissioner.

2. Support of Excavation Systems and Temporarily Shored Existing Below Grade Walls:

a. Survey Targets and Survey Marks: Install monitoring points at 20 feet on-center or as indicated on the Contract Drawings. Survey targets and survey marks must be positioned as close as possible to the ground surface and should be affixed to concrete faces. Additional targets or marks must be installed for each 15 feet of exposed vertical height.

3.5 BASELINE MEASUREMENTS

A. Baseline measurements for all equipment must begin a minimum of 10 days prior to execution of construction activities.

B. Establishment of trigger values for vibration monitoring must consider background vibration levels. Background levels must be recorded prior to commencing construction activities to determine ambient levels of vibration resulting from vehicular traffic. Trigger values for seismographs must be maintained at 0.5 inches per second above that of the peak background levels recorded unless otherwise stated in the Contract Drawings.

3.6 FREQUENCY OF MONITORING

A. At a minimum, survey monitoring readings must be performed twice weekly during excavation. The frequency of monitoring must be increased or decreased as directed by the Commissioner.

B. At a minimum, crack gauges must be read and recorded on a weekly basis. The frequency of monitoring must be increased as directed by the Commissioner.

C. Vibration and groundwater monitoring must be performed on a continuous basis (24/7).

3.7 DATA FORMAT AND TRANSMITTAL

A. Data must be transmitted in an electronic format (MS Excel) and must include all cumulative readings taken. Data must include baseline values and offset measurements. Provide coordinates for readings, as requested. Include the following information for all readings:

1. Instrument type.
2. Date and time of readings.
3. Name of observer.
4. Monitoring Point ID #.
5. Readings.
6. Incremental and cumulative deviation of readings.
7. Weather condition and temperature.
8. Remark of any visual observations of conditions and construction activities.

B. Transmit all data to the Commissioner within two days of taking measurements. Contact the Commissioner immediately in the event that values exceed threshold values specified herein.

3.8 REVIEW AND LIMIT VALUES

A. The following criteria must be used to evaluate the necessity for modifying or ceasing construction activities. Where a work stoppage is required, construction activities must not continue until adequate measures are in place to ensure stability of adjacent structures, excavation support, or utilities. Where movements in excess of the Review level are detected the frequency of data collection must be increased to once daily, or as directed by the Commissioner. The criteria provided must not relieve the Contractor of any responsibility with respect to damage incurred by any structures or utilities.

1. Vibration Monitoring: Peak particle velocities

   a. Review Level

      1) 0.5 inches per second for all buildings, and other structures.

   b. Limit Level

      1) 2.0 inches per second for all buildings, and other structures.

2. Crack Gauge Monitoring: Cumulative movement in any direction

   a. Review Level - 1/16-inch in any direction
   b. Limit Level - 1/8-inch in any direction

3. Survey Monitoring: Displacement

   a. Review Level:

      1) Buildings and other structures

         a) Vertical Movement: 3/16-inch total movement, or 1/8-inch between two consecutive readings
         b) Horizontal Movement: 3/16-inch total movement, or 1/8-inch between two consecutive readings
         c) Angular Distortion: 1/1000

      2) Support of Excavation

         a) Vertical Movement: 1/2-inch total movement, or 1/8-inch between two consecutive readings
         b) Horizontal movement: 1/2-inch total movement, or 1/8-inch between four consecutive readings
         c) Angular distortion: NA

   b. Limit Level:

      1) Buildings and other structures

a) Vertical Movement: 1/4-inch total movement, or 3/16-inch between two consecutive readings
b) Horizontal Movement: 1/4-inch total movement, or 3/16-inch between two consecutive readings
c) Angular Distortion: 1/500

2) Support of Excavation

a) Vertical Movement: 3/4-inch total movement, or 3/16-inch between two consecutive readings
b) Horizontal Movement: 1-inch total movement
c) Angular distortion: NA

3.9 ACTION ITEMS

A. Any movement or vibration exceeding the criteria outlined in 3.8 above must be reported immediately to the Commissioner. Work in the immediate area must be suspended, unless directed otherwise by the Commissioner. Corrective measures to ensure integrity and stability of adjacent structures is the responsibility of the Contractor.

B. In the event that a Review Level is reached, the following must be required:

1. The Commissioner must be immediately notified of the exceedance.
2. The exceedance must be investigated to identify potential correlation to construction activities.
3. The Contractor must meet with the Commissioner to discuss the need for a response to mitigate the potential for readings exceeding the Review Level.
4. Where required, submit a detailed plan of action to mitigate the potential for additional movement or vibration.
5. Install additional instruments as required to evaluate the need for any action necessary to prevent reaching the Limit Level.

C. In the event that a Limit Level is reached, the following must be required:

1. The Commissioner must be immediately notified of the exceedance.
2. The exceedance must be investigated to identify potential correlation to construction activities.
3. Construction must be suspended and the structures must be inspected by the Commissioner, NYCDOT and NYCDOB.
4. The Contractor must take all actions necessary to protect structures and utilities and maintain integrity and stability of said structures and utilities. The Contractor is solely responsible for providing all necessary services in conjunction with developing and applying remedial measures including any required engineering design.
5. The adjacent structures must be visually inspected, and construction methods modified as necessary to maintain vibrations within acceptable levels.

D. Corrective actions requiring repair of any structure is the sole responsibility of the Contractor. Repairs must be at no additional cost to the City of New York and all other agencies and entities.

3.10 WASTE MANAGEMENT

A. Separate and dispose of waste in accordance with the Project's Waste Management Plan.

END OF SECTION 310900

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Stripping and stockpiling rock.
6. Removing above- and below-grade site improvements.
7. Disconnecting, capping or sealing, removing site utilities, and abandoning site utilities in place.
8. Temporary erosion and sedimentation control.

B. Related Requirements:

1. Section 015713 for temporary erosion- and sedimentation-control measures.
2. Section 024119 for Selective demolition.

1.3 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and as indicated on drawings.

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for materials indicated to be stockpiled or otherwise remain City of New York's property, cleared materials must become Contractor's property and must be removed from Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or video recordings.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Commissioner and NYCDOT.
2. Provide alternate routes around closed or obstructed trafficways if required by the Commissioner or the NYCDOT.

B. Utility Locator Service: Notify Call Before You Dig number- 811 for area where Project is located before site clearing.

C. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

D. Tree- and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."

PART 2 - PRODUCTS(NOT USED)

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection."

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to the Commissioner.

3.3 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of NYCDEP & NYCDOT.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.4 TREE AND PLANT PROTECTION

A. Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.5 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.

1. Arrange with utility companies to shut off indicated utilities.
2. The Commissioner will arrange to shut off indicated utilities when requested by Contractor.

B. Locate, identify, and disconnect utilities indicated to be abandoned in place.

C. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by City of New York or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Commissioner not less than two days in advance of proposed utility interruptions.

3.6 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Grind down stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
3. Use only hand methods or air spade for grubbing within protection zones.
4. Chip removed tree branches and dispose of off-site.

3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off City of New York's property.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for walks pavements turf and grasses and plants.
3. Excavating and backfilling for buildings and structures.
4. Drainage course for concrete slabs-on-grade.
5. Subbase course for concrete walks pavements.
6. Subbase course and base course for asphalt paving.
7. Subsurface drainage backfill for walls and trenches.
8. Excavating and backfilling trenches for utilities and pits for buried utility structures.
9. Excavating well hole to accommodate elevator-cylinder assembly.

B. Related Requirements:

1. Section 311000 "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Section 315000 "Excavation Support and Protection" for shoring, bracing, and sheet piling of excavations.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Commissioner.
2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Commissioner. Unauthorized excavation, as well as remedial work directed by Commissioner, will be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock:

1. Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

   a. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom.
   b. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket.

2. Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D1586.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct preexcavation conference at 550 East Tremont Ave, BX NY 10457.

1. Review methods and procedures related to earthmoving, including, but not limited to, the following:

   a. Personnel and equipment needed to make progress and avoid delays.
   b. Coordination of Work with utility locator service.
   c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
   d. Extent of trenching by hand or with air spade.
   e. Field quality control.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Warning tapes.

B. Samples for Verification: For the following products, in sizes indicated below:

1. Warning Tape: 12 inches long; of each color.

1.7 INFORMATIONAL SUBMITTALS

A. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D2487.
2. Laboratory compaction curve according to ASTM D698.

B. Detailed erosion and sedimentation control plan for approval by the Commissioner.

C. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Blasting: Comply with applicable requirements in NFPA 495, "Explosive Materials Code," and prepare a blasting plan reporting the following:

1. Types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
2. Seismographic monitoring during blasting operations.

C. Seismic Survey Agency: An independent testing agency, acceptable to the Commissioner, NYCDPR, and NYCDOB, experienced in seismic surveys and blasting procedures to perform the following services:

1. Report types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
2. Seismographic monitoring during blasting operations.

D. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.

1.9 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Commissioner and NYCDOT.
2. Provide alternate routes around closed or obstructed traffic ways if required by Commissioner & NYCDOT.

B. Utility Locator Service: Notify "Call Before You Dig" for area where Project is located before beginning earth-moving operations. Exercise care to protect existing utilities during earthwork operations.

C. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures as required by DDC General Conditions and as specified in Section 311000 "Site Clearing" are in place.

D. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.

E. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

F. Do not direct vehicle or equipment exhaust towards protection zones.

G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200sieve.

H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.

J. Sand: ASTM C33/C33M; fine aggregate.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.3 DEWATERING

A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades. See Section 312319 - Dewatering for more details.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

3.4 EXPLOSIVES

A. Explosives:

1. If blasting is deemed necessary, obtain written permission from NYC DOB before bringing explosives to Project site or using explosives on Project site.

a. Perform blasting without damaging adjacent structures, property, or site improvements.
b. Perform blasting without weakening the bearing capacity of rock subgrade and with the least-practicable disturbance to rock to remain.

3.5 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:

   a. 24 inches outside of concrete forms other than at footings.
   b. 12 inches outside of concrete forms at footings.
   c. 6 inches outside of minimum required dimensions of concrete cast against grade.
   d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
   e. 6 inches beneath bottom of concrete slabs-on-grade.
   f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.

B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Commissioner.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders, and other materials not classified as rock or unauthorized excavation.

   a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:

   a. 24 inches outside of concrete forms other than at footings.
   b. 12 inches outside of concrete forms at footings.
   c. 6 inches outside of minimum required dimensions of concrete cast against grade.
   d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
   e. 6 inches beneath bottom of concrete slabs-on-grade.
   f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.

3.6 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.7 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.8 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms:

1. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

a. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
b. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
c. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
d. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

2. Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

a. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.9 SUBGRADE INSPECTION

A. Notify Commissioner when excavations have reached required subgrade.

B. If Commissioner determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Commissioner, and replace with compacted backfill or fill as directed.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Commissioner, without additional compensation.

3.10 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Commissioner.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Commissioner.

3.11 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.12 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring, bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.13 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

D. Trenches under Roadways: Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

E. Backfill voids with satisfactory soil while removing shoring and bracing.

F. Initial Backfill:

1. Soil Backfill: Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

   a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

G. Final Backfill:

1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.

H. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.14 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.15 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.16 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.17 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.18 SUBSURFACE DRAINAGE

A. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D698 with a minimum of two passes of a plate-type vibratory compactor.

B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D698 with a minimum of two passes of a plate-type vibratory compactor.
2. Place and compact impervious fill over drainage backfill in 6-inch- thick compacted layers to final subgrade.

3.19 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Place base course material over subbase course under hot-mix asphalt pavement.
2. Shape subbase course to required crown elevations and cross-slope grades.
3. Place subbase course 6 inches or less in compacted thickness in a single layer.
4. Place subbase course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
5. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D698.

C. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D698.

3.20 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place drainage course 6 inches or less in compacted thickness in a single layer.
3. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D698.

3.21 FIELD QUALITY CONTROL

A. Special Inspections: City of New York will engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material classification and maximum lift thickness comply with requirements.
3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.

B. Geotechnical Testing Agency: engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Commissioner.

E. Geotechnical testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, ASTM D2937, and ASTM D6938, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length but no fewer than two tests.

3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.

F. When geotechnical testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.22 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Commissioner; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.23 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off City of New York's property.

B. Transport surplus satisfactory soil to designated storage areas on City of New York's property. Stockpile or spread soil as directed by Commissioner.

1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off City of New York's property.

END OF SECTION 312000

SECTION 312319 - DEWATERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract".

1.2 SUMMARY

A. Section includes all labor, materials, and equipment necessary for monitoring of groundwater levels, pump rates, and discharge volumes for all construction dewatering as shown on the Contract Drawings, as specified herein, and as required by the conditions at the site.

B. The work of this Section includes, but is not limited to the following:

1. Collect groundwater samples required for obtaining all necessary regulatory permits pertaining to groundwater control.
2. Obtain all necessary permits required for execution of the work of this Section.
3. All other labor, equipment, and materials as may be reasonably inferred to be required to make the work under this Section complete.

C. Related Requirements:

1. Work governed by this Section, as shown or specified must be in accordance with the requirements of the Contract Drawings and the New York City Building Code (2022 edition). Examine the Contract Drawings for requirements that directly affect or are affected by work under this Section. A list of those documents and sections include, but is not limited to the following:

   a. Section 033000 "Cast-in-Place Concrete"
   b. Section 310000 "Earthwork"
   c. Section 310900 "Geotechnical Instrumentation and Monitoring of Earthwork"
   d. Section 315000 "Excavation Support and Protection"

1.3 STANDARDS, REFERENCES, AND REGULATORY REQUIREMENTS

A. General: Except as modified or voided by requirements specified herein or by details or notes included in the Contract Drawings, the Work specified under this Section must conform to specifications, standards and other reference documents cited in this Section and/or noted in the Contract Drawings.

B. All Work under this Section must conform to the most restrictive requirements of the New York City Building Code (2022 edition).

C. Geotechnical Engineering Report. See Appendix. Boring and other in situ test logs are made available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between borings. The City of New York will not be responsible for interpretation conclusions drawn from this data by the Contractor.

D. The Contractor must procure and pay for all permits and licenses required to complete the work of this Section, including fees for disposal of groundwater into New York City sewers.

E. The Contractor must meet NYCDEP Limitations for Effluent, NYSDEC and EPA limitations for discharge into any surface water bodies, federal EPA and State Department of Transportation regulations for shipping of regulated substances to off-site disposal facilities, and meet all regulatory requirements imposed by the Treatment, Storage and Disposal Facility. Regulations pertaining to the transport and disposal of regulated substances/materials include, but are not limited to the following:

1. Department of Transportation 49 CFR 172 through 179
2. Department of Transportation 49 CFR 387 (46 FR 30974)
3. Department of Transportation DOT-E 8876
4. Environmental Protection Agency 40 CFR 136 (41 FR 52779)
5. Environmental Protection Agency 40 CFR 262 and 761
6. Resource Conservation and Recovery Act (RCRA)
7. NYCDEC, Rules of the City of New York (RCNY), Title 15, Chapter 19, Use of the Public Sewers.
8. NYCDEP, Limitations for Effluent to Sanitary or Combined Sewers.
9. NYCDEP, Dewatering Sampling and Testing Requirements

F. Any transporter of contaminated/hazardous materials must be licensed in the state of New York.

G. Comply with OSHA (Occupational Safety and Health Administration) Standards and Regulations contained in Title 29 CFR Part 1910.120 "Hazardous Waste Operations and Emergency Response."

H. Where reference is made to one of the above standards the revision in effect at the time of construction must apply.

I. In case of conflict between regulations and specifications, the Contractor must comply with the most stringent requirements outlined in the specifications.

J. Nothing in Article 1.3 must relieve the Contractor of their responsibility of providing a higher standard in order to comply with this Specification.

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions, Section 014000 "Quality Requirements".

B. The Contractor performing the work of this Section must be one specializing in groundwater control including methods to reduce inflow and, in the installation, and operation of groundwater control equipment. Submit evidence substantiating minimum experience/qualifications as per the General Conditions in the installation and maintenance of such systems. The Contractor must designate a superintendent responsible for oversight of all groundwater control operations.

C. The Contractor must retain the services of a Professional Engineer licensed in the State of New York. The Professional Engineer must design the groundwater control system.

1.5 QUALITY CONTROL

A. Materials and work must conform to the latest edition of reference standards specified herein.

B. The Contractor must evaluate the groundwater conditions resulting from excavation of soils and bedrock. The Contractor must evaluate recharge potential of groundwater seepage including but not limited to pumping tests.

C. Groundwater control systems must be capable of operating on a continuous basis throughout excavation and foundation construction. The Contractor must provide adequate backup systems in the event of equipment failure or malfunction.

D. The Contractor's groundwater control system must be capable of maintaining dry stable subgrade conditions.

E. The Contractor's groundwater control system must consider methods and measures necessary to reduce inflow through soils or fissures in rock including but not limited to grouting and installation of pumping wells in an effort to minimize daily discharge quantities.

F. The Contractor's work must not result in damage to adjacent property. Protect adjacent property from the effects of groundwater lowering, as required.

G. The Contractor must record groundwater monitoring data.

1.6 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions, Section 013300 "Submittal Procedures".

1.7 ACTION SUBMITTALS

A. The Contractor must submit the Professional Engineer's calculations, plans, and details of the groundwater control system to the Commissioner for review.

B. The Contractor must submit a method statement for the evaluation of soil permeability, and any field testing to evaluate groundwater recharge.

C. Submit logs of soils encountered during drilling of any observation or test wells installed of the Contractor's own accord. Drilling logs should be submitted within 2 days of completion of the installation.

D. Submit field pumping test results to the Commissioner within 2 days of completion of field tests, as required.

E. Submit shop drawings and manufacturer's literature, and show and describe proposed groundwater control system, general arrangement procedures to be used, method of installation, materials, equipment, methods of treatment and disposal of pumped water, emergency action plans, and procedures for deactivating the system. Proposed procedures and methods of disposal of water must prevent damage to existing structures, roadways and utilities. Shop drawings and literature should be submitted to the Commissioner a minimum of 20 working days prior to mobilization.

F. Submit working drawings and details section, show any installed observation wells and method of maintaining for any additional monitoring undertaken by the Contractor. Working drawings and details should be submitted to the Commissioner a minimum of 20 working days prior to mobilization.

G. Submit any related sheeting and bracing shop drawings in accordance with the requirements of Section 315000, "Excavation Support and Protection".

H. Submit approved water disposal discharge permit (if applicable) and evidence of applicable fee payment a minimum of 10 days prior to start of pumping.

1.8 FIELD CONDITIONS

A. Subsurface Conditions: The subsurface conditions within the development area are generally characterized by uncontrolled fill underlain by sand, silt, and finally bedrock. Groundwater was measured at a depth of about 12 to 16 feet below grade (about el 74.5 and 76 ft). Additional details pertaining to the subsurface conditions are presented in the Geotechnical Engineering Report. See Appendix.

B. Boring logs are available for the Contractor's review. The City of New York makes no predictions or representations regarding the character or extent of soil, or other subsurface conditions to be encountered during the Work. The Contractor must make their own deductions of the subsurface conditions which may affect the methods.

C. The Contractor, by careful examination, must inform themselves as to the nature and location of the work; the conformation of the ground, the nature of the subsurface conditions; the locations of the groundwater table; the character, quality and quantity of the materials to be encountered; the character of the equipment and facilities needed preliminary to and during the execution of the Work; and all other matters which can in any way effect the work.

D. The Contractor must be held to have visited the site and to have familiarized themselves with the existing conditions of adjoining properties, utilities, and buildings.

E. The Contractor must investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to, ingress and egress of the site of the work.

F. The Contractor must become acquainted with the existence and location of all surface and subsurface structures and utilities within the project area and beneath the surrounding streets. Contractor must not damage any of those that are to remain and must leave them accessible and make the necessary provision by sheeting, hanging, supporting, or other means necessary to obtain this result, subject to the approval of the Commissioner, NYCDOB, NYCDOT, and the utility companies involved.

G. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with the City of New York and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of utility owner.

H. Interruption of Existing Utilities: Do not interrupt any utilities serving facilities occupied by the City of New York or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Commissioner's written permission.

I. Where necessary, demolish and completely remove existing underground utilities indicated to be removed from the site. Coordinate with utility companies for shutoff of services if lines are active.

J. Examine the Contract Drawings to determine the sequence of operations, and relation to work of other trades. Start of work will signify acceptance of field conditions and will acknowledge coordination with other trades.

1.9 PERMITS

A. Apply for and obtain required permits related to dewatering.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Contractor must submit all details and other supporting data for materials proposed for use in performing groundwater control operations. All proposed materials must be of a type acceptable to the Commissioner.

B. Equipment proposed for use in groundwater control operations must be of a type acceptable to the Commissioner and must be installed in such a manner that it does not interfere with the operations of work specified under other Sections.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 GENERAL REQUIREMENTS

A. Coordinate location of wells, header pipes, and manifolds, if applicable, as required.

B. Collect and provide all necessary laboratory testing of groundwater samples for the purpose of obtaining regulatory permits.

C. Perform an evaluation of the groundwater conditions including elevations, permeability rates, and potential for groundwater fluctuations. The Contractor's design must account for local geology and must be capable of effectively controlling groundwater as necessary to achieve the proposed subgrade elevations. The Contractor's groundwater control system must be capable of maintaining the site in the dry and maintaining stability of subgrades, excavations, and slopes.

D. The Contractor must take any measures necessary to decrease groundwater flow, including but not limited to grouting, prior to excavation proceeding. The efficacy of all methods to reduce groundwater inflow must be evaluated in the field based on observed conditions.

E. The groundwater control system must be installed for the purpose of dewatering the below grade excavation to a depth of at least 2 feet below the bottom of proposed excavation, or as required to provide a "dry" stable construction site.

F. The groundwater control system must be kept in full operation as required by the Commissioner until adequate measures are in place to resist hydrostatic pressure. This may include the period of excavation, foundation and waterproofing installation.

G. The Contractor must monitor and report groundwater levels outside the excavation and must provide all monitoring results to the Commissioner for review.

3.3 DRAINAGE AND PUMPING

A. It is the responsibility of the Contractor to furnish, operate, and maintain sufficient drainage and pumping facilities to control groundwater within the site so that the excavation can proceed while maintaining stability of excavation support and stabilization systems.

B. Typically, the groundwater must be depressed at all times to at least 2 feet below the excavated ground surface, or as required to provide a stable excavation.

C. Prior to the start of excavation, the Contractor must prepare and submit to the Commissioner their groundwater control plans, including procedures for initial pump tests, and must not proceed until they are approved. Subsequently, the groundwater control plans are to be adjusted as necessary to accomplish the above listed goals and other requirements in this section.

D. The Contractor must protect all monitoring locations. Contractor must be responsible for all costs incurred to repair or replace monitoring equipment damaged as a result of the Contractor's activities.

E. Discharge of the pumped water must be performed in strict accordance with the Erosion and Sediment Control Plan.

F. Pumped water must be held in a settling tank prior to discharge to NYCDEP sewers. Dewatering manufacturer's system must be capable of removing suspended solids such that discharge does not exceed NYCDEP limit of 350 ppm total suspended solids (TSS).

G. The dewatering system must be installed and operated in such a manner as to avoid the movement of fines or loss of ground from below the bearing level and must not influence the stability of surrounding areas. Ensure that no fines are removed by the dewatering system. The collector must be placed at a location approved by the Commissioner.

3.4 CLEANING, PROTECTION, AND ADJUSTMENT

A. The Contractor must patch, repair, or replace any existing improvements, or work of other Sections, damaged or cut by work of this Section, subject to approval by the Commissioner.

B. At termination of activities, the Contractor must remove from the site all equipment and installations of the groundwater control system.

END OF SECTION 312319

SECTION 315000 - EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes temporary excavation support and protection systems and all labor, materials, equipment, and accessories necessary for the completion of all shoring, bracing, and support work as shown on the Contract Drawings, as specified herein, and as required by the conditions at the project site.

B. The work of this Section includes, but is not limited to the following:

1. All professional engineering, surveying, layout, monitoring, and submittals in connection with the work in this Section.
2. Design of all temporary support of excavation (SOE) systems and any temporary bracing of existing foundation structures or utilities required.
3. Installation of sheeting, bracing, and soil support necessary to protect existing buildings, streets, walkways, utilities, and other improvements and excavation against loss of support and movement.
4. Perform exploratory test pits to determine the locations and conditions of existing adjacent utilities.
5. Protection and monitoring of streets and utilities.
6. Maintenance of excavation support and bracing.
7. Monitoring of adjacent buildings and structures, as required.
8. Monitoring of excavation support systems, as required.
9. Removal of excavation support and bracing, as required.
10. Other labor and materials as may be reasonably inferred to be required to make the work under this Section complete.

C. Related Requirements:

1. Provide excavation support in accordance with the requirements of the Contract Drawings and the New York City Building Code (2022 edition).
2. The Contractor must retain a Professional Engineer licensed in the State of New York to replace the City of New York's Geotechnical Engineer as design applicant in DOB TR-1 forms for SOE work. The Contractor's licensed Professional Engineer must prepare signed and sealed SOE design drawings necessary to facilitate the proposed new construction and to properly support all adjacent buildings, structures, sidewalks, streets, yards, and utilities. The Contractor must not be allowed to commence any SOE work, nor excavation requiring SOE to be in place, prior to receipt of DOB approval for the submitted SOE drawings.
3. Examine the Contract Drawings for requirements that directly affect or are affected by the work under this Section. A list of those documents and sections include, but is not limited to the following:

    a. Section 033000 "Cast-in-Place Concrete"

b. Section 310000 "Earthwork"
c. Section 310900 "Geotechnical Instrumentation and Monitoring of Earthwork"
d. Section 312319 "Dewatering"
e. Section 316216 "Steel Piles"

1.3 REFERENCES

A. General: Except as modified or voided by requirements specified herein or by details or notes included in the Contract Drawings, the Work specified under this Section must conform to all applicable provisions of the specifications, standards and other reference documents cited in this Specification and/or noted in the Contract Drawings.

B. All Work under this Section must conform to the most restrictive requirements of the New York City Building Code (2022 edition).

C. Where more stringent, the following codes, standards, and specifications (latest edition), must apply to the Work of this Section, all as modified herein or by the above mentioned Building Code:

1. Building Code Requirements for Structural Concrete, ACI 318
2. Specification for Structural Steel Buildings, ANSI/AISC 360
3. Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7
4. Design Load on Structures During Construction, ASCE 37
5. Structural Welding Code - Steel, ANSI/AWS D1.1
6. Structural Welding Code - Reinforcing Steel, ANSI/AWS D1.4
7. Post Tensioning Institute (PTI) Recommendations for Prestressed Soil and Rock Anchors, PTI DC35.1-14.

D. Geotechnical Engineering Study. See Appendix. Borings and other in situ test logs are made available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between borings. The City of New York will not be responsible for interpretation or conclusions drawn from this data by the Contractor.

E. ASTM (American Society for Testing and Materials) Specifications cited in the reference standards, New York City Building Code (2022 edition), this Specification or in cited reference documents must be the year of adoption or tentative adoption and revision listed in the latest edition of the Annual Book of ASTM Standard, "Index", except that, should a specific year of adoption or revision be cited by the Contract Documents, by New York City Building Code (2022 edition), or be proposed by the Contractor and accepted by the Commissioner, that edition must apply to and control the Work.

F. American Association of State and Highway Transportation Officials (AASHTO) Publications.

G. The Contractor must comply with the most stringent requirements outlined in the specifications.

H. Nothing in Article 1.3 must relieve the Contractor of their responsibility of providing a higher standard in order to comply with this Specification.

1.4 DESIGN CRITERIA

A. Support of excavation and bracing must be designed to accommodate the loading from existing conditions and construction operations. Loads must include, but not be limited to, soil pressure, hydrostatic pressure, and surcharges from structures, stored materials, and equipment (stationary or moving).

B. Support of excavation and bracing systems must be designed to prevent progressive failure in the event of damage or failure of any individual element.

C. Support of excavation and bracing must be designed to limit ground movement, movement or damage of existing structures and utilities, ground loss, fluctuation in groundwater levels resulting from construction activities, and stress increases that may negatively affect existing structures, infrastructure, or utilities.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Prior to work on site, the Commissioner will arrange a series of meetings to discuss coordination and scheduling. Parties to be present: Testing Laboratory, Contractor, Excavation Subcontractor, Commissioner, Special Inspector(s), and any other parties deemed necessary by the Commissioner. Review the earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least three (3) working days prior to convening conference. Record discussions and agreements and furnish a copy of meeting minutes to each participant.

1.6 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions, Section 013300 "Submittal Procedures".

1.7 ACTION SUBMITTALS

A. Product Data:

1. For all proposed materials, include product data, relevant laboratory testing, construction details, material descriptions, performance properties, and dimensions of individual components and profiles, calculations for excavation support and protection system, and all other relevant information.

B. Plans and Shop Drawings:

1. Where the Contractor elects to modify the design from that indicated on the Contract Drawings or is directed to assume design responsibility by the Commissioner, the Contractor must prepare and submit shop drawings and calculations for all support of excavation, rock stabilization and support, underpinning, and bracing systems to be implemented under this Section at least 30 days before beginning work.
2. All shop drawings and calculations must be signed and sealed by a Professional Engineer licensed in the State of New York.
3. Shop drawings must include all necessary notes, plans, elevations, sections, and details to clearly depict the various portions of the work, material types, and methods of installation, and coordination with the work of other trades.

4. Show arrangement, locations, and details of soldier piles, piling, lagging, tiebacks, bracing, and other components of excavation support and protection system according to engineering design relative to property lines, existing structures, and proposed structures.
5. Include sections depicting assumed subsurface profile, including natural groundwater conditions and any anticipated draw down conditions resulting from dewatering operations.
6. Fully detail all connections, including welds, bolting, anchorages, or other means of connection.
7. Indicate type and location of waterproofing.
8. Include a written plan for excavation support and protection, describing all systems, assumptions, requirements for materials and installation, and including sequence of construction of support and protection coordinated with progress of excavation.
9. Include all requirements for pre-loading, post-tensioning, and load testing.
10. Include all necessary notes pertaining to required special inspections and materials testing.
11. Shop drawings must be referenced to the North American Datum of 1983 (NAD83) for horizontal control and the North American Vertical Datum of 1988 (NAVD88) for vertical control.
12. Shop drawings must show all design loads (including surcharge loads from cranes and other equipment, buildings, adjacent structures, stored materials, etc.).
13. Shop drawings must be to scale and must be dimensioned.
14. Shop drawings must be coordinated with the project Monitoring Plan. The shop drawings must include any requirements for monitoring not detailed on the monitoring plan or included in the requirements of Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork".

C. Engineering Services Submittal: For excavation support and protection systems, including analysis data signed and sealed by the qualified professional engineer, licensed in the state of New York, responsible for their preparation.

1.8 INFORMATIONAL SUBMITTALS

A. The Contractor's Professional Engineer licensed in the State of New York must prepare an outline of the Contractor's construction methods and step-by-step procedures together with plans and details of the excavation support system to satisfy the New York City Building Code (2022 edition) requirements and approved drawings. This must be coordinated with relevant submittals identified in this Section and must be submitted and reviewed by the Commissioner for concept before submittal of the shop drawings.

1. Detailed calculations must be provided for all support of excavation, rock stabilization and support, underpinning, and bracing systems implemented under this Section.
2. Calculations must list all references.
3. Calculations must include all details of subsurface profiles, soil design parameters, groundwater levels, and loading conditions (surcharges, etc.).
4. Calculations must detail all assumptions made.
5. Calculations must fully illustrate all equations utilized and must note the reference used for each equation. Where spreadsheets are provided, they must be accompanied by sample calculations illustrating the equation utilized in each cell.
6. Calculations must detail all materials, element sizes, lengths, spacing, and construction sequence, and any requirements for pre-loading and/or post-tensioning.
7. Calculations must detail all connections.
8. Calculations must provide an estimate of deflections and settlement for all support elements, the adjacent ground, and adjacent structures.

B. Monitoring Program: Monitoring must be as per Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork.

C. Existing Conditions: Using photographs, show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by inadequate performance of excavation support and protection systems. Submit before Work begins.

1. The Contractor may perform, if they wish, their own conditions verification survey and must submit any findings that differ from the Commissioner's documentation as specified herein at least 15 days before beginning the work.

D. Certification for Examination of Site and Records: Before proceeding with the Work, submit certification in an acceptable form, signed by the Contractor, stating that careful examination has been made of the site, existing structures, existing adjacent structures, records of utility lines, test boring records, soil samples, subsurface exploration reports, the Contract Drawings.

E. Procedures and methods to be used to ensure safety and stability of all adjacent structures, as well as identification of the entity that will sign the DOB TR-forms as the responsible party for the Structural Stability of adjacent buildings.

1.9 CLOSEOUT SUBMITTALS

A. Record Drawings: Identify locations and depths of capped utilities, abandoned-in-place support and protection systems, and other subsurface structural, electrical, or mechanical conditions.

1.10 QUALITY ASSURANCE

A. Refer to DDC General Conditions, Section 014000 "Quality Requirements".

B. Contractor Qualifications: The Contractor performing the Work of this Section must demonstrate that they have at least three years of recent field experience on projects of similar size, scope, and complexity.

C. Design Supervision: Where applicable, the Contractor must retain the services of a Professional Engineer licensed in the State of New York who must design and supervise installation of all SOE, shoring, and bracing. The Contractor's Professional Engineer must sign and submit all relevant forms for regulatory filings.

D. Surveying and Monitoring: Engage and assign survey monitoring work of this Section to a Professional Land Surveyor licensed in the State of New York. The results of all monitoring work performed by the Contractor must be made immediately available to the Contractor's Professional Engineer responsible for the design supervision of the work specified herein and the Commissioner.

E. Codes and Permits:

1. Comply with the New York City Building Code (2022 edition).
2. All labor, materials, equipment, and services necessary to make the work comply with such requirements must be provided without additional cost to the City of New York.
3. The Contractor must procure and pay for all permits and licenses required to complete the work of this Section.

1.11 QUALITY CONTROL

A. Special Engineering Inspection:

1. The City of New York will engage, under the requirements of Section 1704.1 of the New York City Building Code (2022 edition), one or more Special Inspection Agencies to observe installation and provide all necessary material testing related to the Work of this Section. All inspections and all necessary materials testing must be by Special Inspectors meeting the minimum qualifications outlined in RCNY 101-06.
2. Observation of excavation, sheeting, and shoring and bracing installation must be performed on a full-time basis. Inspections associated with materials testing must be made on a periodic basis, as required, as the work progresses.
3. The Special Inspector(s) for installation and materials testing must log the applicable work and prepare records of daily activities. This must not relieve the Contractor's responsibility to provide any component or system capable of meeting the requirements outlined on the Contract Drawings and as specified herein.
4. The Special Inspector(s) must prepare and submit daily reports summarizing the installation and/or material testing activities. The Special Inspector(s) must prepare records including: items completed each day; name of key personnel performing the work; job and weather conditions; equipment used; detailed construction logs for each element installed, including locations, materials, configuration, dimensions, unusual conditions or other observations; and other general quantities; materials testing; load tests, etc. The Contractor must cooperate and assist the Special Inspector(s) in the making of these records.
5. Where work is observed to be non-conforming, the Special Inspector(s) must immediately inform the City of New York of such conditions in writing. A summary of the observed non-conformance must be issued within 24 hours. The Special Inspector(s) must maintain a tracking log of all non-conformances and must update the tracking log on a daily basis such that corrective measures, if required, can be facilitated in a timely fashion. The tracking log must include such information as ID number, date opened, description of non-conformance, actions required, actions taken, and date closed.
6. The Special Inspector(s) must submit all field logs and test reports necessary to facilitate any corrective design requirements.
7. The Special Inspector(s) must provide all necessary certifications of the Work in compliance with New York City Building Code (2022 edition) requirements.

B. The Contractor must have the sole responsibility for coordinating their work to assure that all tests and inspection procedures required by the Contract Drawings and the New York City Building Code (2022 edition) are properly provided by the Special Inspector(s). The Contractor must cooperate fully with the Special Inspector(s) in the performance of their work.

C. Materials and installed work may require testing at any time as work progresses. Allow free access to material stockpiles and facilities. Tests not specifically indicated herein may be performed at the expense of the City of New York, as required by the Special Inspector(s).

D. Retesting of rejected materials and installed work must be the Contractor's responsibility and must be performed at their expense.

E. The Contractor must notify the Commissioner and all other necessary parties at least 72 hours prior to each day of support of excavation installation to allow for the appropriate personnel to be on site.

F. The role of the Special Inspector(s) must not relive the Contractor from any responsibility with respect to conformance to the proper workmanship, management of materials and waste, or any other requirements of the Contract Drawings.

1.12 FIELD CONDITIONS

A. Subsurface Conditions: The subsurface conditions within the development area are generally characterized by uncontrolled fill underlain by sand, silt, and finally bedrock. Groundwater was measured at a depth of about 12 to 16 feet below grade (about el 74.5 and 76 ft). Additional details pertaining to the subsurface conditions are presented in the Geotechnical Engineering Report. See Appendix.

B. The Contractor, by careful examination, must inform themselves as to the nature and location of the work; the conformation of the ground, the nature of the subsurface conditions; the locations of the groundwater table; the character, quality, and quantity of the materials to be encountered; the character of the equipment and facilities needed preliminary to and during the execution of the Work; and all other matters which can in any way affect the work.

C. The Contractor must be held to have visited the site and to have familiarized themselves with the existing conditions of adjoining properties, utilities, and buildings.

D. Borings are available for the Contractor's review. The City of New York makes no predictions or representations regarding the character or extent of soil, or other subsurface conditions to be encountered during the Work. The Contractor must make their own deductions of the subsurface conditions which may affect the methods or cost of construction of the work hereunder. Additional borings and other exploratory operations may be performed by the Contractor, at the Contractor's option and expense, and following the Commissioner's approval.

E. The Contractor must investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to, ingress and egress of the site of the Work.

F. The Contractor must become acquainted with the existence and location of all surface and subsurface structures and utilities within the project area and beneath the surrounding streets. Contractor must not damage any of those that are to remain and must leave them accessible and make the necessary provision by sheeting, hanging, supporting, or other means necessary to obtain this result, subject to the approval of the Commissioner, New York City Department of Buildings and Department of Transportation, and the utility companies involved.

G. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with the City of New York and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of utility owner.

H. Interruption of Existing Utilities: Do not interrupt any utilities serving facilities occupied by City of New York or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Commissioner's written permission.

I. Where necessary, demolish and completely remove existing underground utilities indicated to be removed from the site. Coordinate with utility companies for shutoff of services if lines are active.

J. Examine the Contract Drawings to determine sequence of operations, and relation to work of other trades. Start of work will signify acceptance of field conditions and will acknowledge coordination with other trades.

1.13 SURVEY AND MONITORING

A. Monitoring must be in accordance with Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork", and the requirements set forth herein.

B. Survey Work: Engage a qualified land surveyor or professional engineer licensed in the state of New York to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks, and record existing elevations.

C. Before starting work, the Contractor's New York State licensed Professional Engineer and Land Surveyor must check and verify governing dimensions and elevations, survey conditions of adjoining structure, and record any prior settlement or cracking of structures, and other improvements.

D. The Contractor must be responsible for monitoring of excavation support systems, adjacent buildings, and other structures as outlined on the Contract Drawings. The Contractor must be solely responsible for monitoring of existing buildings, structures, excavation support, etc.

E. The Contractor must install monitoring points (i.e. for ground movement, vibration, etc.) to adequately monitor and otherwise keep informed of the conditions during the work.

1.14 ERRORS IN DEPTH

A. In the event that any part of the excavation is carried, through error, beyond the depth and the dimensions indicated on the Contract Drawings or called for in the specifications, then the Contractor, at their own expense, must furnish and install gravel, stone, or concrete fill with which to fill to the required level at all locations, subject to the approval of the Commissioner.

1.15 PROTECTION

A. The Work must be executed so that no damage or injury will occur to the existing public and adjacent structures, streets, paving, sewers, gas, water, electric, or any other pipes. Should any damage or injury caused by the Contractor, or anyone in the Contractor's employ, or by the Work under this Contract occur, the Contractor must, at their own expense, restore such damage and must assume all responsibility for such injury.

B. The above must also include the protection of all existing utilities (including sewers, water lines, electrical lines, and telecommunication lines) to remain in use within and adjacent to the area affected by the Work of this project.

C. Monuments, benchmarks, and other reference features on streets bounding this project, must be protected. Should these be disturbed in any manner, replace them at no additional expense to the City of New York.

D. Excavation sides, adjacent structures, and foundations must be protected by means of adequate bracing, shoring, and anchoring at all times. Excavation must not proceed until adequate support for excavation sides is provided. Contractor is solely responsible for the stability, safety, and protection of excavation sides.

E. Provide barricades and warning lights and barriers to prevent accidents, to avoid all necessary hazards and protect the public, the Work, and property at all times, including Saturdays, Sundays, and Holidays.

F. Provide protection to sidewalks and pedestrians as required.

G. Erosion and Sediment Control and dust control must be in accordance with the SWPPP, Contract Drawings Plans and NYS Blue Book.

H. Earthwork must be in accordance with Section 310000, "Earthwork".

I. Monitoring must be in accordance with Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork".

J. The Contractor must maintain the cleanliness of paved streets immediately adjacent to the site through regular sweeping and moistening as required to remove any excess mud, dirt, or rocks tracked from the site. Materials must be covered with a tarpaulin during transport offsite.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Engineering Services: Engage a qualified professional engineer, licensed in the State of New York as defined in DDC General Conditions, to design excavation support and protection systems to resist all lateral loading and surcharge, including but not limited to, retained soil, groundwater pressure, adjacent building loads, adjacent traffic loads, construction traffic loads, material stockpile loads, and seismic loads, based on the following:

1. Compliance with OSHA Standards and interpretations, 29 CFR 1926, Subpart P.
2. Compliance with AASHTO Standard Specification for Highway Bridges or AASHTO LRFD Bridge Design Specification, Customary U.S. Units.
3. Compliance with utility company requirements.
4. Compliance with railroad requirements.

2.2 MATERIALS

A. Materials for use in support of excavation, soil stabilization and support, and bracing systems must be suitable to withstand loads imposed without unintended movement. Materials must be kept in serviceable condition at all times throughout the duration of excavation and foundation construction. Materials must be suitable for a minimum design life of 5 years.

B. Structural Steel:

1. Structural steel W-shapes must conform to ASTM A 992/A 992M, Grade 50, unless otherwise noted on the Contract Drawings.
2. All other structural steel shapes, plates, and sheet piles must conform to ASTM A 572, Grade 50, unless otherwise noted on the Contract Drawings.
3. Miscellaneous steel must conform to ASTM A 36, unless otherwise noted on the Contract Drawings.
4. Pipe for use in piles and bracing elements must conform to the requirements of ASTM A 252, Grade 3, except that the yield strength must be a minimum of 80 ksi, unless otherwise noted on the Contract Drawings.
5. Other structural steel materials are subject to the approval of the Commissioner.

6. Timber for guard rails must be rough sawn, full size, construction grade lumber with a minimum allowable bending stress of 1,500 psi.
7. All other wood and timber for use of elements constructed under this section must be comprised of Southern Pine No. 1 Dense with a minimum fiber bending stress (F_b) equal to 1,000 psi, a minimum fiber compression stress parallel to the grain (F_c) equal to 1,000 psi, and a minimum Young's Modulus (E_{min}) equal to 450,000 psi.
8. Other wood and timber materials are subject to the approval of the Commissioner.

C. Cast-in-Place Concrete:

1. Concrete must have a minimum unconfined compressive strength at 28 days as shown on the Contract Drawings and must meet the requirements of ACI 301.
2. Concrete must meet the requirements outlined in Section 033000, "Cast-in-Place Concrete".
3. Other concrete materials are subject to the approval of the Commissioner.

D. Grout:

1. Grout must consist of a fluid mixture of Portland Cement, fine aggregate (if required), admixtures (if required) and water capable of being pumped, and must be proportioned to achieve the minimum unconfined compressive strength shown on the Contract Drawings.
2. Other grout materials are subject to the approval of the Commissioner.

E. Reinforcing Bars:

1. Standard steel reinforcing bars must consist of deformed bars meeting the requirements of ASTM A 615/A 615M, Grade 60, unless otherwise noted on the Contract Drawings.
2. Reinforcing steel subject to welding must consist of deformed bars meeting the requirements of ASTM A 706, Grade 60, unless otherwise noted on the Contract Drawings.
3. Plain welded wire fabric must meet the requirements of ASTM A 185, unless otherwise noted on the Contract Drawings.
4. Tie wire must be a minimum of 16-gauge and meet the requirements of ASTM A 82, unless otherwise noted on the Contract Drawings.
5. Other reinforcing bar materials are subject to the approval of the Commissioner.

F. Tiebacks:

1. Tieback tendons must consist of single-corrosion protected hollow bars.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Dywidag

b. Nucor Skyline Steel
c. Williams Form Engineering
d. Or approved equal.

2.3 DELIVERY, STORAGE, AND HANDLING

A. Materials ordered and delivered to the project site, before verification of element size and length, will be at the Contractor's risk.

B. After sizes and lengths are verified, the Contractor must deliver materials to the project site in such quantities and at such times to assume continuity of operations to maintain the project schedule.

C. Materials must be stored in orderly groups above ground and blocked during storage to minimize possible distortion of members.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution rquirements.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

3.3 INSTALLATION - GENERAL

A. Excavation support and bracing must be constructed in accordance with the New York City Building Code (2022 edition) requirements.

B. Notify the Commissioner before the start of work. The notifications are to be in accordance with the Contract Drawings.

C. The Contractor must provide, erect, and maintain all necessary support of excavation, soil stabilization and support, and bracing when and where required. Locate excavation support and protection systems clear of permanent construction, so that construction and finishing of other work is not impeded.

D. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Provide alternate routes around closed or obstructed traffic ways if required.

E. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.

F. Support of excavation, soil stabilization and support, and bracing must be erected and maintained to permit excavation to the required foundation subgrade and to the satisfaction of the Commissioner. Systems on which the support or stability of existing structures is dependent must be left in place following completion of the work. In other areas, maintain system until elements are replaced by other bracing or until permanent construction is capable of resisting all imposed loading.

G. The construction and performance of the support of excavation, soil stabilization and support, and bracing work for the purpose of which it is erected must be the entire responsibility of the Contractor.

H. Should any subsidence or any other damage occur, the damage must be made good by the Contractor at their own expense.

I. The Contractor must make use of such methods of work as are best adapted to preserve the safety and stability of foundations, walls, and other parts of affected buildings or structures.

J. During the excavation of work specified in Section 310000, "Earthwork", if additional locations may require sheeting and bracing based on the Contractor's construction methods and procedures, then provide such additional supports at no additional cost to the City of New York. Such additional supports must be designed and constructed in accordance with the requirements of this Section, as per the Contract Drawings.

K. Dewatering, if required, must be in accordance with the requirements of Section 312319, "Dewatering". Such dewatering must be considered part of the excavation and/or underpinning operations.

L. All work must be carried on in such a manner as not to interfere with the progress of the work under this section.

M. Excavation support and bracing must not be removed where it may impact the stability of new construction or that of adjacent structures, infrastructure, or utilities.

N. Materials that affect or impede finished construction must be removed. Removal of such materials must be performed such that no loss of support occurs to adjacent structures, infrastructure or utilities. Any material left in place must be removed to a depth not less than 5 feet below finished grade. Materials removed from the excavation must be immediately removed from the site and properly disposed.

O. Where support of excavation and bracing is required to withstand earth pressures resulting from backfill placement, the backfill must not be placed until after the system is complete and suitable to accommodate such loading conditions.

3.4 SOLDIER PILES AND LAGGING

A. Soldier piles and lagging must be designed and constructed in accordance with the New York City Building Code (2022 edition).

B. Soldier piles and lagging must be adequate to resist earth and hydrostatic pressures and lateral pressures due to surcharge loads, to prevent displacement of adjacent ground; and to prevent loss of support or damage to buildings, utilities, sidewalks and streets. Lateral loads created from adjacent buildings, cranes, and/or street loads must be included in the design.

C. Members must be of adequate size and adequate lateral bracing must be provided to meet design standards for allowable stresses and factors of safety for temporary construction.

D. Install steel soldier piles before starting excavation.

1. Extend soldier piles below excavation grade level to depths adequate to prevent lateral movement.
2. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging.
3. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

E. Install wood lagging within flanges of soldier piles as excavation proceeds.

1. Trim excavation as required to install lagging.
2. Fill voids behind lagging with soil, and compact.

F. Install lateral support and bracing at locations indicated on Drawings and secure to soldier piles.

G. Excavation adjacent to the soldier piles and lagging must not exceed a depth of 2 feet below the point of lateral support and bracing to be installed, unless specifically designed to accommodate additional unbraced excavation depths. Lateral support must be installed and preloaded as required prior to continuing excavation.

3.5 SHEET PILING

A. Sheet piling must be designed and constructed in accordance with the New York City Building Code (2022 edition).

B. Sheet piling must be adequate to resist earth and hydrostatic pressures and lateral pressures due to surcharge loads, to prevent displacement of adjacent ground; and to prevent loss of support or damage to buildings, utilities, sidewalks and streets. Lateral loads created from adjacent buildings, cranes, and/or street loads must be included in the design.

C. Members must be of adequate size and adequate lateral bracing must be provided to meet design standards for allowable stresses and factors of safety for temporary construction.

D. Before starting excavation, install one-piece sheet piling lengths and tightly interlock vertical edges to form a continuous barrier.

E. Accurately place the piling using templates and guide frames unless otherwise recommended in writing by the sheet piling manufacturer.

1. Limit vertical offset of adjacent sheet piling to 60 inches.
2. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

F. Cut tops of sheet piling to uniform elevation at top of excavation.

G. Excavation adjacent to the sheet piling must not exceed a depth of 2 feet below the point of lateral support and bracing to be installed, unless specifically designed to accommodate additional unbraced excavation depths. Lateral support must be installed and preloaded as required prior to continuing excavation.

3.6 TIEBACKS

A. Drill, install, grout, and tension tiebacks.

B. Performance test at least 10 percent of the tieback elements to 133 percent of the design load.

C. Proof test all tiebacks that have not been performance tested. Proof test must be performed to 133 percent of the design load.

D. The load schedule for proof tests and performance tests must be in accordance with the Post Tensioning Institute (PTI), latest edition, recommended procedures and per the Contract Drawings.

E. The acceptance criteria for total movement and creep movement must be in accordance with the PTI recommended limits and per the Contract Drawings.

F. Anchor lock-off loads must be at least 80 percent of the anchor design load upon completion of testing. Tiebacks should be lifted-off to ensure that lock-off is within 5 percent of the lock-off value. If it is, the tieback can be locked off. If it is not, repeat the lock-off/lift-off test until within 5 percent of the assigned value.

G. Maintain tiebacks in place until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.7 BRACING

A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.

1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Commissioner.
2. Install internal bracing if required to prevent spreading or distortion of braced frames.
3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.8 MODIFICATIONS DURING CONSTRUCTION

A. The Commissioner must direct modification of the design of support of excavation, soil stabilization and support, and bracing where necessary to address field conditions. System type or element size, length, orientation, and spacing must be modified as required.

B. Any changes to the design must be documented through sketches or plan revisions and must be submitted for record. All sketches and revisions plans must be signed and sealed.

3.9 UPKEEP

A. Monitor and maintain excavation support and protection system.

B. Prevent surface water from entering excavations by grading, dikes, or other means.

C. Continuously monitor vibrations, settlements, and movements to ensure stability of excavations and constructed slopes and to ensure that damage to permanent structures is prevented.

3.10 FIELD QUALITY CONTROL

A. Grout: Grout must be sampled and tested by an independent Special Inspection Agency retained by the City of New York. The Contractor must notify the Commissioner a minimum of 48 hours prior to required sampling. Sampling and Casing of a set of six 2-inch cubes or 3-inch diameter cylinders must be performed for each batch. For each set, one sample must be tested at 3 days, 7 days, and three cubes tested at 28 days. One sample must be kept as a reserve in case of low grout strength results. If the 28-day sample breaks at a strength greater than or equal to the required, then the last sample must also be tested at 28 days. If not, the last sample must be tested at 56 days.

B. Concrete: Sampling and testing must be in accordance with the Contract Drawings and Section 033000, "Cast-in-place Concrete".

C. Excavation Support and Underpinning: All excavation support and underpinning must be subject to special inspection in accordance with the New York City Building Code (2022 edition).

D. Survey-Work Benchmarks: Resurvey benchmarks regularly during installation of excavation support and protection systems, excavation progress, and for as long as excavation remains open.

1. Maintain an accurate log of surveyed elevations and positions for comparison with original elevations and positions.
2. Promptly notify Commissioner if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.
3. All monitoring must be in accordance with Section 310900, "Geotechnical Instrumentation and Monitoring of Earthwork", and the Contract Drawings.

E. Promptly correct detected bulges, breakage, or other evidence of movement to ensure that excavation support and protection system remains stable.

F. Promptly repair damages to adjacent facilities caused by installation or faulty performance of excavation support and protection systems.

3.11 REMOVAL

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and earth and hydrostatic pressures.

1. Remove in stages to avoid disturbing underlying soils and rock or damaging structures, pavements, facilities, and utilities.
2. Remove excavation support and protection systems to a minimum depth of 5 feet below overlying construction, and abandon remainder.
3. Fill voids immediately with approved backfill compacted to density specified in Section 310000, "Earthwork".
4. Repair or replace, as approved by Commissioner, adjacent work damaged or displaced by removing excavation support and protection systems.

3.12 CLEAN-UP

A. All excess material must be removed from the site and legally disposed of.

B. All lumber, forms, and metal work must be removed immediately after completion of local areas. The Contractor must be responsible for removal of all debris produced by Work to this Section from the site.

C. Sidewalks and streets adjoining the property stall be broom cleaned and free of debris, rubbish, trash and obstructions of any kind caused by the Work of this Section.

3.13 WASTE MANAGEMENT

A. Separate and dispose of waste in accordance with the project's Waste Management Plan.

END OF SECTION 315000

SECTION 316216 - STEEL PILES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. This Section includes:

1. Provide all labor, materials, equipment and accessories necessary for, or incidental to the completion of all driven pile work as shown on the Contract Drawings, as specified herein, and as required by the conditions at the site, are a part of the contract.
2. All engineering, surveying, layout, monitoring, and submittals in connection with the work in this section.
3. Excavation associated with the installation of driven piles having an allowable compressive, uplift, and lateral capacity as shown on the Contract Drawings.
4. Furnish and install driven piles having design capacities, and at the locations, shown on the Contract Drawings and as directed.
5. Cut all piles to the required cut-off elevation levels on the Contract Drawings.
6. Furnish and install a minimum of three percent of production piles as index piles.

    a. Provide Wave Equation Analysis of pile driving using Weave Equation Analysis Program (WEAP) to demonstrate the proposed piles driven with the proposed hammer/cushion systems must achieve the pile design capacities specified herein and won't damage the piles during installation. The Wave Equation Analysis results must be signed and sealed by a Professional engineer licensed in the State of New York and provided to the Commissioner for review prior to proceeding with the index pile program.
    b. Provide all labor, materials, equipment and services to perform dynamic testing on all of the driven index piles during installation using Pile Driving Analyzer (PDA).
    c. Provide post-process PDA data with a Case Pile Wave Analysis Program (CAPWAP and Case Method) analysis driven with PDA prior to proceeding with production piles. The PDA/CAPWAP results must verify that the hammer transfer energy and efficiency of the hammer/cushion system at the end of driving is as specified in the WEAP analysis.

7. Provide all labor, materials, equipment, and services and perform successful axial compression load tests, uplift load tests, and lateral load tests as specified herein and as required per for the Contract Drawings.
8. Provide pile splice details and calculations, as required to meet the design requirements.
9. Protect all installed piles from damage caused by other construction activities.
10. Provide as-built pile location survey and identification plan, provide all data in excel table format.
11. Obtain all permits required for work covered by this specification.
12. Disposal of pile cut-offs in accordance with the requirements of the Contract Documents.
13. Attendance at pre-construction meetings with the Commissioner.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/1 and that employs installers and supervisors who are trained and approved by manufacturer.

C. The City of New York must engage, under the requirements of Section 1704.1 of the Building Code, one or more Special Inspection Agencies to observe and provide all the necessary material testing related to the work of this Section. All inspections and all material testing must be performed by Special Inspectors meeting the minimum qualifications outlined in RCNY 101 06.

1. The Special Inspector(s) for the driven pile installation must log the installation of each pile and determine when it has attained the required depth and driving resistance as established by Contractor's WEAP analysis, Index Pile Program, PDA, CAPWAP and Case Method, as well as load tests. This must not relieve the Contractor's responsibility to provide piles of required capacity outlined in the Contract Documents.
2. The Special Inspector(s) must prepare and submit daily reports summarizing pile installation and/or material testing activities. The Contractor must cooperate and assist the Special Inspector(s) in the making of these records. All field logs and test reports must be submitted to the Commissoner for review and to determine any corrective action.
3. The Special Inspector(s) must observe all pile load tests and must log test loads, pile head and tell-tale movements, and other observations as required to provide a full evaluation of the load test data. All load test data must be delivered to the Commissioner for review.
4. The Contractor must have the sole responsibility for coordinating their work with the Special Inspector(s) to assure that all tests and inspection procedures required by the Building Code and the Contract Documents are properly provided. The Contractor must cooperate fully with the Special Inspector(s) in the performance of their work.
5. Where work is observed to be non-conforming, the Special Inspector(s) must immediately inform the Commissioner of such conditions in writing. A summary of the observed non-conformance must be issued within 24 hours. The Special Inspector(s) must maintain a tracking log of all non-conformances and must update the tracking log on a daily basis such that corrective measures, if required, can be facilitated in timely fashion. The tracking log must include such information as pile ID number, date opened, description of non-conformance, actions required, actions taken, and date closed.
6. The Special Inspector will keep a record of each pile installed. This record will include at a minimum the following data:

    a. Date of driving
    b. Pile number
    c. Type and size of pile
    d. Type, Number, and location of splices
    e. Pile length before driving
    f. Length of cut-off
    g. Elevation of pile top and tip to nearest 0.1 inch immediately after driving.

1) Final elevation of pile top and tip after redriving of entire pile group

h. Lower limit (elevation) of pile coating after driving
i. Hammer type and size
j. Hammer Speed
k. For impact hammers, blows per foot of driven length, and blows per inch where driving resistance exceeds 75 blows per foot
l. Blows per 1/2 inch of redrive
m. The time pile driving started, interrupted, resumed, and stopped.
n. Description of any unusual circumstances affecting the driving of the particular pile
o. Sounded length of each pile
p. Slope of Pile.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver piles to Project site in such quantities and at such times to ensure continuity of installation. Handle and store piles at Project site to prevent buckling or physical damage.

1. Painted Piles: Protect finish and touch up paint damage before driving piles.

1.6 FIELD CONDITIONS

A. Protect structures, underground utilities, and other construction from damage caused by pile driving.

B. Site Information: A geotechnical report has been prepared for this Project and is referenced elsewhere in the Project Manual for information only.

C. Preconstruction Photographs: Inventory and record the condition of adjacent structures, underground utilities, and other construction. Document conditions that might be misconstrued as damage caused by pile driving. Comply with DDC General Conditions "Photographic Documentation."

PART 2 - PRODUCTS

2.1 STEEL H PILES

A. The pile materials must be in accordance with the Contract Documents.

B. The pile section sizes must be in accordance with the Contract Documents.

C. Provide number and dimensions of piles indicated from tip to cutoff, plus not less than 12 inches (305 mm) of overlength for cutting piles at cutoff elevation.

2.2 PILE ACCESSORIES

A. Splice Unit: Manufacturer's standard splice unit, fabricated from two connected steel plates, of same material as steel H pile or material of equal strength, shaped to encase web and part of each flange.

2.3 FABRICATION

A. Fabricate and assemble piles in shop to greatest extent possible.

B. Pile-Length Markings: Mark each pile with horizontal lines at 12-inch intervals; label the distance from pile tip at 60-inch intervals. Maintain markings on piles until driven.

C. Fabricate full-length piles to eliminate splicing during driving, with ends square.

D. Fabricate full-length piles by splicing lengths of steel H pile together. Accurately mill meeting ends of piles and bevel for welding. Maintain axial alignment of pile lengths. Maintain structural properties of pile across splice.

1. Splice Units: Notch web of pile, fit splice unit into position, and weld according to manufacturer's written instructions and AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.
2. Continuously Welded Splices: Splice piles by continuously welding according to AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.
3. Splice piles during fabrication.

E. Fit and weld driving points to tip of pile according to manufacturer's written instructions and AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.

2.4 EQUIPMENT

A. General:
1. Furnish pile driving equipment of a type generally used in standard pile driving practice, operated at the manufacturer's specified rate, to develop the required rated energy per blow to drive and achieve specified capacity.
2. In driving all piles in the work, including index piles, the same make and model of pile hammer must be used throughout; the operation of hammers with regard to speed, height of fall or stroke, pressure and all other variable factors must be the same; and the methods used in driving piles must be substantially the same.

B. Hammer:
1. Furnish pile driving hammers of a size and type able to deliver consistently effective dynamic energy, suitable to the piles to be driven and to the subsurface materials into which they are to be driven.
2. The pile driving hammer must have a minimum rated energy that will be based on the results of the WEAP and in-situ PDA tests.
3. The hammer must be in first-class operating condition having a minimum energy capable of driving the pile to the required capacity. The valve mechanism must be serviced and kept in first-class condition so that the length of stroke will be accurately maintained at all times during driving. The cap block material must have uniform elastic properties during driving, providing superior energy transmission, and must be replaced if crushed, burned or damaged. Any hammer not operating in accordance with the manufacturer’s specifications must be deemed unsatisfactory by the Commissioner and must be replaced immediately by the Contractor.
4. The pile cushion must be 9-inch thick aluminum and micarta, or approved equal cushion. Scrap timber must not be used as cushion material.

C. Leads:
   1. All piles must be driven using fixed leads constructed in such a manner as to afford freedom of movement to the hammer, and capable of holding the pile firmly in correct position and alignment as well as in axial alignment with the hammer.
   2. Use fixed rigid type pile driver leads that will hold the pile firmly in position and in axial alignment with the hammer to ensure support of the pile during driving. Free-swinging leads will not be permitted. Extend leads to within 2 feet of the elevation at which the pile enters the ground.
   3. Leads must be of sufficient length so that the use of a follower will not be necessary.
   4. Suitable anvils or cushions must be used to prevent undue damage of the pile butts. Pile driving must be continuous for each pile

D. Pre-Drilling Equipment
   1. Pre-drilling equipment and/or spudding must be adequate to pass the specified pile through any and all obstructions encountered.
   2. Pre-drilling will be required for all piles located within 25 feet of adjacent buildings or other sensitive structures.

E. Load test frames, in accordance with requirements of ASTM D1143 and ASTM D3966.

F. Hydraulic Jack(s) and Pressure Gauges

   1. Hydraulic jack(s) must be equipped with the necessary gauges and piping which must transmit constant load to the pile.
   2. Hydraulic jack(s) must be rated for a load capacity of at least 1.5 times the total test load.
   3. Hydraulic jacks(s) must have sufficient ram so that the full test load can be applied at no more than 80% of its extension.
   4. Pressure gauge must be able to read pressures accurately to the nearest 50 psi and must have a range equivalent to at least twice the pressure

G. Dial Gauges

   1. Dial gauges must be capable of reading to the nearest 0.001 inch, and must have a travel of at least 3 inches. Dial gauges must be calibrated in the field by the contractor in the presence of the Special Inspector.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Site Conditions: Do not start pile-driving operations until earthwork fills have been completed or excavations have reached an elevation of 6 to 12 inches above bottom of footing or pile cap.

3.3 DRIVING EQUIPMENT

A. Pile Hammer: Air-, steam-, hydraulic-, or diesel-powered type capable of consistently delivering adequate peak-force duration and magnitude to develop the ultimate capacity required for type and size of pile driven and character of subsurface material anticipated.

B. Hammer Cushions and Driving Caps: Between hammer and top of pile, provide hammer cushion and steel driving cap as recommended by hammer manufacturer and as required to drive pile without damage.

C. Leads: Use fixed, semifixed, or hanging-type pile-driver leads that hold the full length of pile firmly in position and in axial alignment with hammer.

3.4 DRIVING PILES

A. General: Continuously drive piles to elevations or penetration resistance indicated or established by static load testing of piles. Establish and maintain axial alignment of leads and piles before and during driving.

B. Predrilling: Provide pre-excavated holes where indicated, to depths indicated. Drill holes with a diameter less than the largest cross-section dimension of pile.

1. Firmly seat pile in predrilled hole by driving with reduced energy before starting final driving.

C. Heaved Piles: Redrive heaved piles to tip elevation at least as deep as original tip elevation with a driving resistance at least as great as original driving resistance.

D. Driving Tolerances: Drive piles without exceeding the following tolerances, measured at pile heads:

1. Location: 4 inches from location indicated after initial driving, and 6 inches after pile driving is completed.
2. Plumb: Maintain 1 inch in 48 inches from vertical, or a maximum of 4 inches, measured when pile is aboveground in leads.
3. Batter Angle: Maximum 1 inch in 48 inches from required angle, measured when pile is aboveground in leads.

E. Redriving Piles

1. Unless otherwise shown on the Contract Drawings, take optical survey measurements to establish the elevation of the top of each pile immediately after driving (or redriving) and, subsequently, after driving (or redriving) the entire pile group. Redrive piles that the Commissioner determines have heaved or uplifted 0.25 inch or more from their original elevations and piles immediately adjacent thereto as directed by the Commissioner.
2. Redrive until both the original tip elevation and the driving resistances shown on the Contract Drawings have been obtained, except that if original tip elevation cannot be reached, driving may be discontinued at a resistance of 150 percent of that shown on the Contract Drawings.
3. Perform redriving at times approved by the Commissioner.
4. Equipment for redriving must be specified for original driving except that use of a free hanging hammer will be permitted.
5. Do not cut off piles until the Commissioner has determined that no further redriving is required.

F. Final Driving Criteria

1. Continuously drive each pile at the locations indicated to final bearing within the Contract Documents.
2. Final driving resistance must be demonstrated by the successful pile load tests, the PDA, and CAPWAP and Case Method results, and as approved by the Special Inspector.
3. The penetration resistancs in the bearing stratum must be adjusted by the Special Inspector to account for any penetration resistance measured in the overlying strata.

G. Withdraw damaged or defective piles and piles that exceed driving tolerances, and install new piles within driving tolerances.

1. Fill holes left by withdrawn piles using cohesionless soil material such as gravel, broken stone, and gravel-sand mixtures. Place and compact in lifts not exceeding 72 inches.
2. Fill holes left by withdrawn piles as directed by Commissioner.

H. Abandon and cut off rejected piles as directed by Commissioner. Leave rejected piles in place, and install new piles in locations as directed by Commissioner.

I. Cut off tops of driven piles square with pile axis and at elevations indicated.

3.5 OBSTRUCTIONS

A. No extra payment will be made to the Contractor for overcoming of obstructions under any condition whatsoever.

B. Potential obstructions to pile driving exist in the soil layers above the bearing stratum. The Contractor must spud and/or pred-drill, as necessary, to facilitate subsequent pile installation. Spudding must displace potential obstacles to pile penetration and the diameter of the spudded hole must be sufficient to preclude resistance to the pile penetration by the obstructi

C. If a production pile encounters an obstruction which will damage the pile tip or cause the pile to drift off location, the pile must be pulled and the obstruction removed by spudding, augering, drilling or other approved methods, and the pile must be re-driven.

D. The use of driving shoes or hard points must be at the discretion and the responsibility of the Contractor.

E. Replacement of piles damaged by obstructions must be the responsibility of the Contractor.

3.6 LOAD TESTS - COMPRESSION

A. Pile load capacity must be confirmed by pile load tests.

B. The hydraulic jack must be equipped with the necessary gauges and piping, which must transmit constant load to the pile. The apparatus for applying the vertical load must be as given in ASTM D1143. Piles must have been in place a minimum of three days before loading. Loading, testing, and recording of data must be under the direct inspection of the Special Inspection Agency.

C. Professional engineer and Land Surveyor licensed in the state of New York will provide the necessary services in connection with the load test.

D. Load Schedule:
1. Loading must be applied in increments, in accordance with the "Standard Loading Procedure" requirements of ASTM D1143 and the Building Code.
2. The load schedule must be applied in increments of 25 percent of the total design load, up to twice the pile design load.
3. Each load increment must be maintained until the rate of settlement is not greater than 0.01 inch per hour, but no longer than two hours.
4. The total test load must remain in place for at least 24 hours and until the rate of settlement does not exceed 0.012 inches over a period of 12 hours.
5. After the required holding time, the test load must be removed in decrements of 25 percent of the total test load with one hour between decrements.

E. Settlement Measurements:
1. Measure pile settlements with at least three dial gauges capable of reading to nearest 0.001 inch. Dial gages must have a travel distance at least three inches. Dial gauges must be mounted on an independent steel test frame to prevent relative movement during the load test.
2. Establish a separate mirror, wire, scale set-up, with scale capable of measuring to the nearest 0.015 inch.
3. Provide independent survey level measurement of the pile using optical level survey equipment capable of reading to the nearest 0.005 feet.
4. Readings of time, load, and movement must be taken before and after of each load increment or decrement.
5. In addition to readings required by ASTM D1143, readings must be taken at one-half minute, one minute, two minute, and four minute intervals after the application of each load increment and decrement.
6. Twenty four hours after the entire test load has been removed, a final reading must be taken.

F. Allowable Compressive Capacities:
1. Compressive capacity must be the lesser of:
   a. Fifty (50) percent of the applied load causing a net settlement of the pile of not more than one-hundredth of an inch per ton of applied load. Net settlement must be defined as the gross settlement due to the total test load minus the rebound after removing one hundred percent of the test load; or
   b. Fifty (50) percent of the applied load causing a net settlement of ¾ inch. Net settlement must be defined as the gross settlement due to the total test load minus the rebound after removing one hundred percent of the test load less the amount of elastic shortening in the pile due to the test load.

G. A full report meeting the requirements of ASTM D1143 and indicating compliance with the requirements of the Building Code must be prepared by the Special Inspector, signed and sealed by a Professional engineer licensed in the State of New York under whose direction the load test inspection was performed.

3.7 LOAD TESTS - UPLIFT

A. Pile load capacity must be confirmed by pile load tests.

B. The hydraulic jack must be equipped with the necessary gauges and piping, which must transmit constant load to the pile. The apparatus for applying the vertical load must be as given in ASTM D3689. Piles must have been in place a minimum of three days before loading. Loading, testing, and recording of data must be under the direct inspection of the City of New York's Special Inspection Agency.

C. Professional engineer and Land Surveyor licensed in the state of New York will provide the necessary services in connection with the load test.

D. Load Schedule:

1. Loading must be applied in increments, in accordance with the "Standard Loading Procedure" requirements of ASTM D3689 and the Building Code.
2. The load schedule must be applied in increments of 25 percent of the total design load, up to twice the pile design load.
3. Each load increment must be maintained until the rate of settlement is not greater than 0.01 inch per hour, but no longer than two hours.
4. The total test load must remain in place for at least 12 hours and until the rate of settlement does not exceed 0.12 inches over a period of 12 hours.
5. After the required holding time, the test load must be removed in decrements of 25 percent of the total test load with one hour between decrements.

E. Settlement Measurements:

1. Measure pile settlements with at least three dial gauges capable of reading to nearest 0.001 inch. Dial gages must have a travel distance at least three inches. Dial gauges must be mounted on an independent steel test frame to prevent relative movement during the load test.
2. Establish a separate mirror, wire, scale set-up, with scale capable of measuring to the nearest 0.015 inch.
3. Provide independent survey level measurement of the pile using optical level survey equipment capable of reading to the nearest 0.005 feet.
4. Readings of time, load, and movement must be taken before and after of each load increment or decrement.
5. In addition to readings required by ASTM D3689, readings must be taken at one-half minute, one minute, two minute, and four minute intervals after the application of each load increment and decrement.
6. Twenty four hours after the entire test load has been removed, a final reading must be taken.

F. Allowable Uplift Capacities:

1. The maximum allowable load must not exceed the ultimate load capacity divided by a factor of safety of two.

G. A full report meeting the requirements of ASTM D3689 and indicating compliance with the requirements of the Building Code must be prepared by the Special Inspector, signed and sealed by a Professional Engineer licensed in the State of New York under whose direction the load test inspection was performed.

3.8 LOAD TEST - LATERAL

A. Pile load capacity must be confirmed by pile load tests.

B. The hydraulic jack must be equipped with the necessary gauges and piping, which must transmit constant load to the pile. The apparatus for applying the vertical load must be as given in ASTM D3966. Piles must have been in place a minimum of three days before loading. Loading, testing, and recording of data must be under the direct inspection of the City of New York's Special Inspection Agency.

C. Professional engineer and Land Surveyor licensed in the state of New York will provide the necessary services in connection with the load test.

D. Load Schedule:

1. The load schedule must be applied in increments of 25 percent of the total design load, up to twice the pile design load.
2. Each load increment must be maintained until the rate of settlement is not greater than 0.01 inch per hour, but no longer than two hours.
3. The total test load must remain in place for at least 24 hours and until the rate of settlement does not exceed 0.012 inches over a period of 12 hours.
4. After the required holding time, the test load must be removed in decrements of 25 percent of the total test load with one hour between decrements.

E. Settlement Measurements:

1. Measure pile settlements with at least three dial gauges capable of reading to nearest 0.001 inch. Dial gages must have a travel distance at least three inches. Dial gauges must be mounted on an independent steel test frame to prevent relative movement during the load test.
2. Establish a separate mirror, wire, scale set-up, with scale capable of measuring to the nearest 0.015 inch.
3. Provide independent survey level measurement of the pile using optical level survey equipment capable of reading to the nearest 0.005 feet.
4. Readings of time, load, and movement must be taken before and after of each load increment or decrement.
5. In addition to readings required by ASTM D3689, readings must be taken at one-half minute, one minute, two minute, and four minute intervals after the application of each load increment and decrement.
6. Twenty four hours after the entire test load has been removed, a final reading must be taken.

F. Allowable Lateral Capacities:

1. Free Headed Piles – The maximum test load must be at least twice the proposed allowable load. The allowable load must be not more than one half of the test load that produces a gross lateral movement of one inch at the ground surface.
2. Fixed Headed Piles – The results of the load test must be used to verify the input parameters used in the lateral load analysis performed by the Commissioner. In the absence of specific project requirements, as determined by the Commissioner, the allowable pile lateral capacity must be the load that produces a gross lateral movement of 3/8-inch at the ground surface in the lateral load analysis.

G. A full report meeting the requirements of ASTM D3966 and indicating compliance with the requirements of the Building Code must be prepared by the Special Inspector, signed and sealed by a Professional Engineer licensed in the State of New York under whose direction the load test inspection was performed.

3.9 QUALITY CONTROL

A. Driven pile construction work must be subject to special inspection that will be performed by the City of New York's Special Inspection Agency.

B. Contractor must have the sole responsibility for coordinating this work with the Special Inspector to assure that all tests and inspection procedures required by Contract and/or Public Agencies, and are properly provided. The Contractor must cooperate fully with the Special Inspector in the performance of their work.

C. The Special Inspector will keep records, including items completed each day, job and weather conditions, a log of each pile installed with soil strata encountered, water entry and flow, driving difficulties, obstructions, description of bearing material, depth and size of pile, plumbness, location of pile center with respect to design location, top of pile elevation, reinforcing steel, grouting, and any other pertinent construction details. These records will be forwarded each week during drilled pile operations to the Commissioner. The Contractor must cooperate and assist the Special Inspector in making of these records.

D. The Special Inspector will notify the Contractor promptly of any operation not in compliance with these specifications and will issue non-conformance reports.

E. Materials and installed work may require testing at any time during progress of work. Allow free access to material stockpiles and facilities. Retesting of rejected materials and installed work will be Contractor's sole responsibility and expense.

3.10 AS-BUILT SURVEY

A. Upon completion of the installation of 25%, 50%, 75% and 100% of the driven piles in each work area, the Contractor must prepare an as-built survey of the location of the driven piles. The survey must include driven pile numbers, depths, deviations (x,y, and plumbness), any rejected or abandoned driven piles and their replacements, and elevations of the tops of the driven piles after cutting off.

B. The survey must be signed and sealed by a Professional Land Surveyor licensed in the State of New York and must be submitted to the Commissioner and approved before construction of the pile caps.

C. The submission of this as-built survey must be completed in a timely manner such that if any additional or replacement driven piles are required, they can be installed prior to the Contractor demobilizing from the project site.

D. If replacement driven piles are required due to driven piles being installed out of the specified tolerances, the replacement driven piles and any expenses related to additional driven piles, enlarged pile caps, and re-design must be the responsibility of the Contractor.

3.11 PROTECTION AND MONITORING OF ADJACENT STRUCTURES, STREETS, AND UTILITIES

A. The work must be executed so that no damage or injury will occur to the existing public and adjoining or adjacent structures, streets, paving, sewers, or utilities. Should any damage or injury caused by the Contractor, or anyone in Contractor's employ, or by the work under this section occur, the Contractor must repair such damage and must assume all responsibility for such injury.

B. Protection and monitoring of adjacent structures during the work of this Section must be in accordance with the Construction Protection Plan, and Building Code.

3.12 TOUCHUP PAINTING

A. Clean field welds, splices, and abraded painted areas and field-apply paint according to SSPC-PA 1. Use same paint and apply same number of coats as specified for shop painting.

1. Apply touchup paint before driving piles to surfaces that are immersed or inaccessible after driving.

3.13 DISPOSAL

A. Remove withdrawn piles and cutoff sections of piles from site, and legally dispose of them off City of New York's property.

END OF SECTION 316216

SECTION 316800 - FOUNDATION ANCHORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. This Section includes:

1. Provide all labor, materials, equipment and services and perform all operations required for the complete work of installing double corrosion protected permanent foundation anchors at the locations shown and of the capacities shown on the drawings as specified herein.
2. Actual free and bond lengths must be as shown on the Contract Drawings or as determined by the Contactor's Professional Engineer licensed in the State of New York based upon the anchor design capacity with calculations submitted to the Commissioner for review.
3. Anchor location survey and identification plan.
4. As-built Drawings

B. Related Requirements:

1. Section 310000 - "Earthwork"
2. Section 315000 - "Excavation Support and Protection"

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of grout mix design, steel core bars, and miscellaneous steel members.

B. Shop Drawings: Show fabrication and installation details of foundation anchors, anchor installation and testing procedure.

1. Include plans, elevations, sections, details, and attachments to other Work.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity meeting the requirements of DDC General Conditions Section 014000 1.7/C/1.

C. Quality Control Inspection:

1. The Contractor's permanent anchor installation and tensioning work must be subject to quality control inspection, which must be performed on a full-time basis by the Special Inspector
2. The Contractor must have the sole responsibility for coordinating their work with the Special Inspector to assure that all tests and inspection procedures required by the Contract Documents are property provided. The Contractor must cooperate fully with the Special Inspector in the performance of their work.

D. The Special Inspector must keep records, including items completed each day, job and weather conditions, a log of each permanent tie-down anchor, depth and size of drill hole, grouting of the hole, and any other pertinent construction details. The Contractor must cooperate with the Special Inspector in the making of these records.

E. The Contractor must prepare and submit installation records of each permanent tie-down anchor installed. These logs must be prepared separately from the logs of the Special Inspector.

F. The Special Inspector will notify the Contractor and Commissioner must notify the Construction Manager promptly of any part of the work of this section not in compliance with these specifications.

G. Testing Service: The Contractor must employ a testing laboratory to perform pre-construction material testing on the grout for the permanent tie-down anchors with the results of all tests submitted to the Commissioner for review. Employ an independent testing laboratory to perform construction-phase grout testing, as required.

H. Materials and installed work may require testing at any time as work progresses. Allow free access to material stockpiles and facilities. Tests not specifically indicated herein may be done at Contractor's expense, as required. Re-testing of rejected materials and installed work must be Contractor's responsibility and must be done at the Contractor's expense.

PART 2 - PRODUCTS

2.1 FOUNDATION ANCHORS

A. Foundation anchor hole diameter must be as shown on the Contract Drawings.

B. Foundation anchor reinforcement must be permanent double corrosion protected threadbars manufactured by Dywidag Systems International, Inc., SAS Stress Steel, or approved equivalent made of steel conforming to ASTM A722 Grade 150.

1. Anchor design capacity must be as shown on the Contract Drawings.
2. Anchors must be unkinked and free of nicks or injurious defects that interrupt the continuity of the corrosion protection materials and the steel bar encased within.

C. The anchors must be furnished complete with all components and accessories, including but not limited to double corrosion protected threadbars, bearing plates, washers, gaskets, nuts, steel tubes, grout sleeves, grout pipes, smooth and corrugated sheaths and mastic corrosion inhibitor. Actual bond and free-stressing lengths must be determined by the Contractor's Professional Engineer licensed in the State of New York based upon the anchor design capacity with calculations submitted to the Commissioner, and the Special Inspector for review. Minimum anchorage lengths must be as follows:

1. Bond Length - The bond length of the anchors must be as prescribed on the Contract Drawings.
2. Fress Stressing Length - The free stressing length of the anchors must extend to top of Building Code Class 1d rock, or better and must not be less than 10 feet below the foundation subgrade.

D. Bearing plates must conform to ASTM A36 and must be galvanized, unless grade 50 is called for in the contract drawings.

E. Nuts must be hexagonal head, heavy-duty type conforming to ASTM A-325 and must be galvanized.

F. The Contractor must furnish certified copies of mill reports for each test and copies of certificates for each lot showing the nominal size, area, weight per linear foot, Guaranteed Ultimate Tensile Strength (GUTS), yield strength, modulus of elasticity, total elongation and other physical properties of the threadbar material required for the design, inspection and installation of the anchors. Elongation tests must be specified in ASTM Designation A421 and A416. Mill reports, certificate and test results must be submitted to the Commissioner, and the Special Inspector not less than 7 days prior to installation.

G. Cement grout to be used for grouting the permanent double corrosion protected anchor into the drill hole must be proportioned to satisfy the requirements of ACI Standard 318-89 Section 18.16 for a minimum 28-day compressive strength of 5,000 psi. When tested by U.S. Army Corps of Engineers guideline CRD-C81-64, Method of Test for Expansion of Grout Mixtures, the mix must have an expansion of 3 percent and no bleeding must be evident.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 INSTALLATION

A. Socket Anchorage - The anchorage length of each anchor must equal or exceed the minimum free strength length plus bond length specified on the contract drawings.

1. The anchor free stressing length into the rock must be considered to start at the bottom of the new structural the anchor will tie in to (e.g. footing, slab, etc.).
2. The anchor bond length must be considered to start at the bottom of the free stressing length or at the top of Building Code Class 1d rock or better, which ever is deeper.
3. The anchorage diameter must be at least 6 inches. Hole must be kept clean until the anchors are installed

B. Rejection of Holes: Holes rejected because of non-conformance to alignment tolerances or because they intercept other holes must be filled with grout and another hole must be drilled at the Contractor's expense. The location of the replacement hole must be subject to approval by the Commissioner.

3.3 ANCHOR PLACEMENT

A. Each anchor hole must be cleaned of all drill cuttings, sludge, and debris before the anchor is inserted and grouted.

B. Centralizers, spacers or other suitable centering devices must be placed at the top of the bar and at a maximum of 2 feet from the bottom of the anchor, with additional centralizers located not more than 10 feet on-ceter for the full length of the foundation anchor. Centralizers and spacers may be made of any material, (except wood) not deleterious to the pre-stressing steel or PVC sheathing, and must be in accordance with the manufacturer's recommendations.

C. A smooth plastic tuving, fitting snugly over the corrugated sheathing, must be provided in the free stressing length and must guarantee unobstructed elongation during stressing.

D. Anchor centerlines must be normal to the bearing plates.

E. No welding must be allowed in the vicinity of the foundation anchors.

3.4 GROUTING

A. Anchors must be tremie-grouted with cement grout having a minimum of 28-day strength of 5,000 psi.

1. Grout must be placed from the bottom of the hole to the top of the ground surface until uncontaminated grout returns to the surface.
2. Grout must be pumped into the bottom of the drill hole using a tremie-pipe prior to foundation anchor insertion into the hole.

3.5 ANCHOR STRESSING AND TESTING EQUIPMENT

A. All stressing and testing must be carried out prior to the installation of permanent foundation elements including: footings, mat foundation, and slabs.

B. All stressing and testing must be carried out using a center hole hydraulic jack and pump system.

C. The ram travel of the jack must be long enough to permit a minimum anchor elongation equal to the theortical elastic elongation of the bond length and free stressing length at 80 percent of the maximum travel of the ram. If stressing is performed in increments of load, the ram travel must be long enough to permit the theoretical computed anchor elongation of the bond length and free stressing length under each load increment at 90 percent of the maximum travel of the ram.

D. The hydraulic pump must be capable of fully applying each load increment in less than 2 minutes but without transmitting dynamic or impact loads to the anchor.

E. The hydraulic jack and pressure gauge must be calibrated as a set. Proof of calibration must be submitted to the Special Inspector for review and approval 2 weeks prior to use.

F. The pressure gauge dial face must be scribed such that the smallest graduation is not greater than 100 psi.

G. Elongation of the anchor must be measured with a dial gauge fixed to a tripod or some other support device at a sufficient distance from the anchor so as not to be affected by the load being applied to the anchor. The dial gauge must permit reading to a minimum accuracy of 0.001 inches. The maximum elongation of the threadbar must be less than 90% of the full travel of the dial gauge ram.

3.6 ANCHOR TESTING - PERFORMANCE TESTING

A. Performance testing must be performed on the first five anchors and 10 percent of the remaining permanent anchors. Until the first five Performance Tests are completed and approved, no additional anchors must be installed, except at the Contractor's risk. Drilling of anchor holes may proceed.

B. The ten percent of foundation anchors to be performance tested must be drilled at the locations, chosen by the Contractor and shown on the shop drawings. Locations are subject to the approval of the Commissioner.

C. The performance testing must be performed after the grout has attained a minimum compressive strength of 5,000 psi.

D. Performance testing must proceed by placing and recycling test loads as follows.
1. P = Design Load, per contract documents
2. AL = load necessary to maintain alignment of stressing and testing equipment.
3. Stage 1: AL, 0.25P
4. Stage 2 : AL, 0.25P, 0.5P
5. Stage 3: AL, 0.25P, 0.5P, 0.75P
6. Stage 4 AL, 0.25P, 0.5P, 0.75P, 1.0P
7. Stage 5: AL, 0.25P, 0.5P, 0.75P, 1.0P, 1.2P,
8. Stage 6: AL, 0.25P, 0.5P, 0.75P, 1.0P, 1.2P, 1.33P

E. Each load must be held for a minimum of 1 minute or until the rate of movement is less than 0.001 inches per minute. The final 1.33P load must be held for 50 minutes. At the 1.33P load, a creep test must be performed by holding the load constant and recording readings at 1, 2, 3, 4, 5, 6, 10, 20, 30, 40, 50 and 60 minutes. Upon completion of creep test, reduce load and lock-off as specified herein.

3.7 ANCHOR STRESSING - PROOF TESTING

A. Every anchor, except Performance Tested anchors, must first be proof-tested load by stressing the bar to 133% its design load shown on the drawings in increments of 25% of the design load. The gauge pressure must be held at that load for a period of not less than 5 minutes. Dial readings must be recorded at 1, 2, 3, 4, 5, 6, 10, 20, 30, 40, 50 and 60 minutes. The applied force must then be reduced appropriately to attain the submitted and approved lock-off load.

B. Proof testing of the anchors may be performed prior to or after construction of the foundation footing. However, if the Contractor elects to perform proof testing after the footing has been constructed, the Contractor does so at their own risk and will be required to replace any anchor that does not meet the acceptance criteria given in this specification. This includes, but is not limited to any and all modifications to the pile cap to accept the replacement anchor

C. After the anchor grout has had an adequate setting time to attain a minimum design compressive strength, the Contractor must tension the anchor in accordance with the approved shop drawings and the following test procedures and requirements.

3.8 PERFORMANCE AND PROOF TESTING ACCEPTANCE CRITERIA

A. Acceptance criteria at the maximum specified test load of 133 percent of the design load are as follows:

1. The total movement measured at the anchor head must be at least 80 percent of the theoretical elastic elongation of the total free stressing length (both above and below the top of rock)
2. The total movement measured at the anchor head must be less than the sum of the theoretical elastic elongation of the total free stressing length and 50 percent of the theoretical elastic elongation of the bond length measured from the head of the jack to the center of the bond length.
3. Proof Tests: The creep movement measured at the anchor head under the maximum specified test load must be less than 0.04 inch between the 1 minute and 10 minute readings.
4. Performance Tests: The tie-down anchor creep movement measured at the anchor head must be less than 0.04 inch elongation occurring between the 1 minute and 10 minute readings.

B. If any foundation anchor fails to meet acceptance criteria, the Contractor must retest the anchor and determine the actual capacity which will produce the acceptance criteria. Additional anchors must then be installed in accordance with these specifications at a location specified by the Commissioner and tested to verify if the total capacity of the anchors exceed the specified transfer load. No payment must be made for additional anchors, anchor testing or any necessary structural connections. The cost of all structural redesign and review must be entirely borne by the Contractor.

3.9 LOCK-OFF AND LIFT-OFF ANCHOR TESTING

A. All anchors must be reloaded to the specified lock-off load as stated in the Contract Drawings or reviewed submittals.

B. The tensioning process must be so conducted that the applied load and the elongation of the anchor may be measured at any time. The zero point for measurement of anchor elongation must be established by the application of an initial alignment load equal to 10% of the specified transfer load. During the tensioning of each anchor, records must be kept of gauge pressure and of anchor elongation at each specified jacking force. The anchor elongation must be measured using a dial gauge capable of measuring to 0.001 inch.

C. Pressure gauges must be checked every week and at any time that there are indications of erratic results, the pressure gauge must be checked against a master gauge, which must be kept on site for this purpose. All tensioning must be done in the presence of the Commissioner or Special Inspector. Immediately after the lock-off, the Contractor must make a lift-off test for each anchor to confirm the transfer load. If the load in an anchor as determined by lift-off, is less than 5 percent of the lock-off load, the anchor must be reloaded and locked off as directed by the Commissioner or Special Inspector. The anchor, if rejected, must be unloaded, the anchor head recession filled in with grout and a replacement anchor must be installed as directed by the Commissioner or Special Inspector at no additional cost to the City of New York.

3.10 QUALITY CONTROL

A. The City of New York will retain a Special Inspector who will be responsible for special inspection of the tie-down anchor installation.

B. Special Inspector will review all submittals related to the materials, installation, and testing of the tie-down anchor prior to the start of work.

C. Special Inspector will provide inspection of the installation of all the permanent tie-down anchors, including drilling, grouting, and anchor placement.

D. Special Inspector will provide inspection of the tie-down anchor performance and proof testing.

E. Cooperate with the Commissioner in the performance of the required tests.

F. The Contractor must replace all anchors that that are rejected by the Special Inspector.

3.11 FINISHING

A. Permanent protection of the tie-down anchor head against corrosion must be provided in accordance with the manufacturer's specifications. Fill recessed area around satisfactorily tested anchor with non-shrink cement grout. The Contractor must submit anchor head corrosion protection materials and procedures to the Commissioner for approval as part of the shop drawing submittal.

END OF SECTION 316800

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Hot-mix asphalt paving.
2. Hot-mix asphalt overlay.
3. Cold milling of existing asphalt pavement.
4. Hot-mix asphalt patching.
5. Asphalt surface treatments.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for demolition and removal of existing asphalt pavement.
2. Section 312000 "Earth Moving" for subgrade preparation, fill material, separation geotextiles, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
3. Section 321313 "Concrete Paving" for concrete pavement and for separate concrete curbs, gutters, and driveway aprons.
4. Section 321373 "Concrete Paving Joint Sealants" for joint sealants and fillers at pavement terminations.
5. Section 321400 "Unit Paving" for bituminous setting bed for pavers and for stone and precast concrete curbs.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at 550 E. Tremont Avenue.

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

   a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
   b. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: Include technical data and tested physical and performance properties.

1. Herbicide.
2. Paving geotextile.
3. Joint sealant.

B. Hot-Mix Asphalt Designs:

1. Certification, by the Commissioner and NYCDOT, of approval of each hot-mix asphalt design proposed for the Work.
2. For each hot-mix asphalt design proposed for the Work.

C. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates: Include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.

1. Aggregates.
2. Asphalt binder.
3. Asphalt cement.
4. Emulsified asphalt prime coat.
5. Tack coat.

B. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by the New York City Department of Transportation.

C. Testing Agency Qualifications: Qualified in accordance with ASTM D3666 for testing indicated.

D. Regulatory Requirements: Requirements for Asphaltic concrete, including, but not limited to handling, equipment, transportation etc., not specified herein must conform to the more stringent requirements of the latest editions of the New York City Department of Transportation's Standard Highway Specifications, New York State Department of Transportation Standard Specifications, and AASHTO "Standard Specification for Transportation, Materials, Methods of Sampling and Testing."

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Prime Coat: Minimum surface temperature of 60 deg F.
2. Tack Coat: Minimum surface temperature of 60 deg F.
3. Slurry Coat: Comply with weather limitations in ASTM D3910.
4. Asphalt Base Course and Binder Course: Minimum surface temperature of 40 deg F and rising at time of placement.
5. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: ASTM D692/D692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

C. Fine Aggregate: ASTM D1073 or AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

D. Mineral Filler: ASTM D242/D242M, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: ASTM D6373 or AASHTO M 320 binder designation PG 64-22.

B. Asphalt Cement: ASTM D3381/D3381M for viscosity-graded material ASTM D946/D946M for penetration-graded material.

C. Tack Coat: ASTM D977 or AASHTO M 140 emulsified asphalt, or cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

D. Water: Potable.

2.3 AUXILIARY MATERIALS

A. Recycled Materials for Hot-Mix Asphalt Mixes:must consist of asphalt millings that pass a 2” sieve. Chunks or slabs of millings that do not pass a 2" sieve will require additional mechanical processing before added to a stockpile. A flat or elongated particle is defined herein as one which has its greatest dimension more than three (3) times its least dimension. Provide material consisting of particles where not more than 30%, by weight, of the particles retained on a ½ in. sieve are flat or elongated. Acceptance for this requirement will be by visual inspection. Recycled asphalt pavement (RAP) must be bituminous material that is well-graded from coarse to fine and free from organic or other deleterious material, including tar. This material is at least 95%, by weight, reclaimed bituminous material. No soundness or Plasticity Index testing will be required. If RAP exceeds 50% of total aggregate, fractionation will be required. Fractionation is the mechanical separation (sieving) of RAP into sand RAP and stone RAP fractions. Fractionated RAP stockpiles must be tested for gradation and asphalt content separately, and must be listed as separate lines on mix designs. The fractionation limit must be shown on the mix design. RAP must be from pavements from: New York City streets, NYSDOT Highways; no residential or commercial pavement must be used. If RAP materials from other sources are stored at producer’s yard, the materials from other sources must be in clearly marked and separate stockpiles. RAP must not contain asphalt plant waste material or rejected asphalt mix. Recycled asphalt shingles (RAS) must not be used. This prohibition covers both manufacturer’s waste and post-consumer tear-offs.

B. Herbicide: Commercial chemical for weed control, registered by the EPA, and not classified as "restricted use" for locations and conditions of application. Provide in granular, liquid, or wettable powder form.

C. Sand: ASTM D1073, Grade No. 2 or No. 3.

2.4 MIXES

A. Recycled Content of Hot-Mix Asphalt: If RAP exceeds 50% of total aggregate, fractionation will be required. Fractionation is the mechanical separation (sieving) of RAP into sand RAP and stone RAP fractions. Fractionated RAP stockpiles must be tested for gradation and asphalt content separately, and must be listed as separate lines on mix designs. The fractionation limit must be shown on the mix design. RAP must be from pavements from: New York City streets, NYSDOT Highways; no residential or commercial pavement must be used. If RAP materials from other sources are stored at producer’s yard, the materials from other sources must be in clearly marked and separate stockpiles. RAP must not contain asphalt plant waste material or rejected asphalt mix. Recycled asphalt shingles (RAS) must not be used. This prohibition covers both manufacturer’s waste and post-consumer tear-offs. The proportion of reclaimed asphalt pavement permitted within each mix must be not less than 30 percent for the top and not less than 30 percent for the bottom courses as per Local Law #71 of 2011.

B. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes designed in accordance with procedures in AI MS-2, "Asphalt Mix Design Methods" and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Protection: Provide protective materials, procedures, and worker training to prevent asphalt materials from spilling, coating, or building up on curbs, driveway aprons, manholes, and other surfaces adjacent to the Work.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Commissioner, and replace with compacted backfill or fill as directed.

3.4 COLD MILLING

A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

1. Mill to a depth of 1-1/2 inches.
2. Mill to a uniform finished surface free of excessive gouges, grooves, and ridges.
3. Control rate of milling to prevent tearing of existing asphalt course.
4. Repair or replace curbs, driveway aprons, manholes, and other construction damaged during cold milling.
5. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
6. Patch surface depressions deeper than 1 inch after milling, before wearing course is laid.
7. Handle milled asphalt material in accordance with approved waste management plan required in DDC General Conditions Section 017419 "Construction Waste Management and Disposal."
8. Keep milled pavement surface free of loose material and dust.
9. Do not allow milled materials to accumulate on-site.

3.5 PATCHING

A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseat concrete pieces firmly.

1. Undersealing: Pump hot undersealing asphalt under rocking slab until slab is stabilized or, if necessary, crack slab into pieces and roll to reseat pieces firmly.
2. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.

C. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd..

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

D. Placing Single-Course Patch Material: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

E. Placing Two-Course Patch Material: Partially fill excavated pavements with hot-mix asphalt base course mix and, while still hot, compact. Cover asphalt base course with compacted layer of hot-mix asphalt surface course, finished flush with adjacent surfaces.

3.6 SURFACE PREPARATION

A. Ensure that prepared subgrade has been proof-rolled and is ready to receive paving. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces.

B. Herbicide Treatment: Apply herbicide in accordance with manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

C. Emulsified Asphalt Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.10 to 0.30 gal./sq. yd. per inch depth. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.

1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
2. Protect primed substrate from damage until ready to receive paving.

D. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd..

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.7 HOT-MIX ASPHALT PLACEMENT

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course and binder course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at a minimum temperature of 250 deg F.
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches from strip to strip to ensure proper compaction of mix along longitudinal joints.
2. Complete a section of asphalt base course and binder course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.8 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method in accordance with AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.9 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density, Marmust Test Method: 96 percent of reference laboratory density in accordance with ASTM D6927, but not less than 94 percent or greater than 100 percent.
2. Average Density, Rice Test Method: 92 percent of reference maximum theoretical density in accordance with ASTM D2041/D2041M, but not less than 90 percent or greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.10 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce thickness indicated within the following tolerances:

1. Base Course and Binder Course: Plus or minus 1/2 inch.
2. Surface Course: Plus 1/4 inch, no minus.

B. Pavement Surface Smoothness: Compact each course to produce surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course and Binder Course: 1/4 inch.
2. Surface Course: 1/8 inch.
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.11 SURFACE TREATMENTS

A. Slurry Seals: Apply slurry coat in a uniform thickness in accordance with ASTM D3910 and allow to cure.

1. Roll slurry seal to remove ridges and provide a uniform, smooth surface.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined in accordance with ASTM D3549/D3549M.

C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement in accordance with ASTM D979/D979M.

1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared in accordance with ASTM D2041/D2041M, and compacted in accordance with job-mix specifications.
2. In-place density of compacted pavement will be determined by testing core samples in accordance with ASTM D1188 or ASTM D2726/D2726M.

a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than three cores taken.
b. Field density of in-place compacted pavement may also be determined by nuclear method in accordance with ASTM D2950/D2950M and coordinated with ASTM D1188 or ASTM D2726/D2726M.

E. Replace and compact hot-mix asphalt where core tests were taken.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.13 WASTE HANDLING

A. General: Handle asphalt-paving waste according to approved waste management plan. Comply with DDC General Conditions

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes Concrete Paving . Including the Following:

1. Curbs and gutters.
2. Walks.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for general building applications of concrete.
2. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Laboratory Test Reports: For concrete paving mixtures, documentation indicating that cured concrete complies with Solar Reflectance Index requirements.

C. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Admixtures.
4. Curing compounds.
5. Applied finish materials.
6. Bonding agent or epoxy adhesive.
7. Joint fillers.

B. Material Test Reports: For each of the following:

1. Aggregates: Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

C. Hot-Weather Concrete Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C150/C150M, portland cement .

B. Normal-Weight Aggregates: ASTM C33/C33M, , uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.

C. Water: Potable and complying with ASTM C94/C94M.

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

2.5 RELATED MATERIALS

A. Joint Fillers: ASTM D1751, asphalt-saturated cellulosic fiber ASTM D1752, cork or self-expanding cork or in preformed strips.

B. Bonding Agent: ASTM C1059/C1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Epoxy-Bonding Adhesive: ASTM C881/C881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.

B. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

C. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength (28 Days): 4000 psi.
2. Slump Limit: 4 inches, plus or minus 1 inch.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M and ASTM C1116/C1116M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 312000 "Earth Moving."

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.4 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
2. Provide tie bars at sides of paving strips where indicated.
3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 0 feet unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent concrete paving:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes.

   a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

   a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.

3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.
3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture-retaining-cover curing as follows:

1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-feet- long; unleveled straightedge not to exceed 1/2 inch.
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch.
6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.10 FIELD QUALITY CONTROL

A. Special Inspections: City of New York will engage a qualified testing agency to perform tests and inspections.

B. Concrete Tests: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C172/C172M will be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231/C231M, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31/C31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39/C39M; test one specimen at seven days and two specimens at 28 days.

   a. A compressive-strength test is to be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results to be reported in writing to Commissioner, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests to contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Commissioner but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency will make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Commissioner.

G. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 CORRECTIVE WORK AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Commissioner.

B. Drill test cores, where directed by Commissioner, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 321316 - DECORATIVE CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Colored concrete paving and flush curbs.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to decorative concrete paving, including but not limited to, the following:

a. Concrete mixture design.
b. Quality control of concrete materials and decorative concrete paving construction practices.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.

C. Laboratory Test Reports: For concrete paving mixtures, documentation indicating that cured concrete complies with Solar Reflectance Index requirements.

D. Samples for Verification: For each type of exposed color indicated in 12 x 12 inch square for verification by the Commissioner. For concrete admixture color provided by alternate manufacturers, provide 12 x 12 inch square samples, and include control sample using admixture color by basis-of-design manufacturer as a control sample.

E. Design Mixtures: For each decorative concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified ready-mix concrete manufacturer, and testing agency.

B. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Admixtures.
4. Curing compounds.
5. Bonding agent or epoxy adhesive.
6. Joint fillers.

C. Material Test Reports: For each of the following:

1. Aggregates. Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups of full-thickness sections of decorative concrete paving to demonstrate typical joints; surface color, pattern, and texture; curing; and standard of workmanship.
2. Build mockups of decorative concrete paving in the location and of the size indicated or, if not indicated, build mockups where directed by Commissioner and not less than 96 inches by 96 inches. Include fully filled joint and float finish.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Commissioner specifically approves such deviations in writing.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

C. Hot-Weather Concrete Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms**,** steel reinforcement**,** and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves of a radius of 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, Grade 60; deformed.

B. Steel Bar Mats: ASTM A184/A184M; with ASTM A615/A615M, Grade 60 deformed bars; assembled with clips.

C. Joint Dowel Bars: ASTM A615/A615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.

2.4 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, portland cement of Type compatible with integral concrete colorant and compliant with New York City Parks requirements.

C. Normal-Weight Aggregates: ASTM C33/C33M, , uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.

D. Color Pigment: ASTM C979/C979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.

1. Basis-of-Design: Subject to compliance with requirements, provide Sika Corporation; SikaColor 120G - C284 Landmarks Gray or comparable product by one of the following:

a. EA Pigments Corp.
b. Davis Color Inc.
c. Or approved equal.

E. Water: Potable and complying with ASTM C94/C94M.

2.5 AGGREGATE SETTING BED MATERIALS

A. 3/4 Inch Graded Aggregate for Base: Sound, crushed stone or gravel complying with ASTM D448 for Size No. 8.

2.6 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Corporation.
b. Euclid Chemical Company (The); an RPM company.
c. Sika Corporation.
d. Or approved equal.

E. Waterborne, Membrane-Forming, Curing Compound: ASTM C309, Type 1, Class B, nondissipating, non-yellowing, manufactured for use with colored concrete.

1. Curing compound must be pigmented type matching color of integrally colored concrete and must be approved by coloring admixture manufacturer.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Corporation.
b. Euclid Chemical Company (The); an RPM company.
c. Laticrete International, Inc.
d. Or approved equal.

2.7 RELATED MATERIALS

A. Joint Fillers: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D8139, semirigid, closed-cell polypropylene foam in preformed strips.

B. Bonding Agent: ASTM C1059/C1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Epoxy-Bonding Adhesive: ASTM C881/C881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.8 CONCRETE MIXTURES

A. Obtain each color, size, type, and variety of concrete mixture from single manufacturer with resources to provide concrete of consistent quality in appearance and physical properties.

B. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.

C. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

D. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength (28 Days): 4000 psi.
2. Slump Limit: 4 inches, plus or minus 1 inch.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M and ASTM C1116/C1116M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase and base surface below decorative concrete paving to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
2. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 312000 "Earth Moving."

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

B. Protect adjacent construction from discoloration and spillage during application of color hardeners, release agents, stains, curing compounds, and sealers.

3.4 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.5 INSTALLATION OF STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.6 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
2. Butt Joints: Use bonding agent or epoxy-bonding adhesive as required by Project application at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
3. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 20 linear feet, every 400 square feet, and around hard object, hydrants, manholes, covers and similar construction unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent decorative concrete paving:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.

   a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.

2. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

F. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices.

G. Curbs: Use design mixture for automatic machine placement. Produce curbs and to required cross section, lines, grades, finish, and jointing. Comply with approved Shop Drawings.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.8 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

3.9 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Compound: Apply immediately after final finishing. Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

1. Cure integrally colored concrete with a pigmented curing compound if required by integral color manufacturer.

F. Curing and Sealing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.10 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch.

2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/2 inch.
4. Lateral Alignment and Spacing of Dowels: 1 inch.
5. Vertical Alignment of Dowels: 1/4 inch.
6. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
7. Joint Spacing: 3 inches.
8. Contraction Joint Depth: Plus 1/4 inch, no minus.
9. Joint Width: Plus 1/8 inch, no minus.

3.11 CORRECTIVE WORK AND PROTECTION

A. Remove and replace decorative concrete paving that is broken or damaged or does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Commissioner.

B. Detailing: Grind concrete "squeeze" left from tool placement. Color ground areas with slurry of color hardener mixed with water and bonding agent. Remove excess release agent with high-velocity blower.

C. Protect decorative concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain decorative concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321316

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Hot-applied joint sealants.
3. Joint-sealant backer materials.
4. Primers.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for sealing nontraffic and traffic joints in locations not specified in this Section.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data:

1. Concrete pavement joint sealants.
2. Joint-sealant backer materials.

1.5 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Testing: Performed by a qualified testing agency.

1.7 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint sealants from single manufacturer for each sealant type.

2.2 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backer materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.3 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Self-Leveling, Silicone Joint Sealant: ASTM D5893/D5893M, Type SL.

2.4 HOT-APPLIED JOINT SEALANTS

A. Hot-Applied, Single-Component Joint Sealant, Type I: ASTM D6690.

2.5 JOINT-SEALANT BACKER MATERIALS

A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.

B. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

2.6 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.4 INSTALLATION OF JOINT SEALANTS

A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions.

C. Install joint-sealant backers to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backer materials.
2. Do not stretch, twist, puncture, or tear joint-sealant backer materials.
3. Remove absorbent joint-sealant backer materials that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants immediately following backer material installation, using proven techniques that comply with the following:

1. Place joint sealants so they fully contact joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants in accordance with the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:

1. Remove excess joint sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.5 CLEANING AND PROTECTION

A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

END OF SECTION 321373

SECTION 321400 - UNIT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Concrete unit pavers.
2. Aggregates, and sand setting bed materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data:

1. For materials other than water and aggregates.
2. For the following:

a. Pavers.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Third-Party Certified Life Cycle Assessment: For each product.

C. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C136.

D. Samples for Initial Selection: For each type of unit paver.

E. Samples for Verification: For full-size units of each type of unit paver indicated. Assemble no fewer than five Samples of each type of unit on suitable backing and grout joints. Include Samples of the following:

1. Each color and dimension of concrete unit paver.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.

C. Sample Warranty: Sample of manufacturer's standard warranty for paving units.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for unit pavers, indicating compliance with requirements.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: An entity that employs installers who have Concrete Paver Installer Certification from the Interlocking Concrete Pavement Institute (ICPI) with the following designation:

1. Commercial Paver Technician Designation.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Cast mockups of full-size sections, 10 feet by 10 feet minimum.
2. Build mockup of full thickness section of all concrete paving types to demonstrate color gradient, typical tooled control joints pattern and concrete aggregate surface finish, texture and color, curing and standard of workmanship.
3. Do not proceed with remaining Work until workmanship, color and finish are approved by the Commissioner.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.

B. Store aggregates and sand where grading and other required characteristics can be maintained and contamination avoided.

1.9 COORDINATION

A. Coordinate the Work of this Section with load and installation tolerances of substrates and contiguous work. Refer to Civil, Structural and Architectural Drawings and Specifications for requirements.

1.10 FIELD CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

1.11 WARRANTY

A. Manufacturer's Warranty:

1. Paver Warranty: Manufacturer agrees to furnish replacement pavers for properly installed product per industry standard installation guidelines that prove defective, including product defects causing cracking, breakage, or deterioration of units within specified warranty period.

a. Warranty Period: Five years from date of Substantial Completion.
b. Warranty does not cover damage due to overloading slabs resulting in failure, color matching, replacement labor, breakage due to handling and drops, heavy equipment or construction damage, neglect, negligence or vandalism, and normal wear including chipping and scraping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 CONCRETE PAVERS

A. Concrete Pavers, Solid Paving Units, Normal-Weight Concrete: SRI three year aged minimum 0.28, initial 0.33. Solid paving units made from normal-weight concrete with a compressive strength not less than 5000 psi, water absorption not more than 5 percent according to ASTM C140, and no breakage and not more than 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C67.

1. Thickness: 3 inches.
2. Face Size and Shape:

a. 6 inch by 12 inch rectangular.

3. Color: Match Commissioner's sample.
4. Basis of Design Product: Subject to compliance with requirements, provide "Umbriano Enduracolor" in colors Summerwheat and Midnight Sky, "Thornbury" in color Bavarian, "Artline" in color Tuscany, and concrete pavers as manufactured by Unilock, or a comparable product by one of the following:

a. Hanover.
b. Wassau.

c. Or approved equal.

2.3 AGGREGATE SETTING-BED MATERIALS

A. 1 1/2 Inch Graded Aggregate for Subbase: Sound, crushed stone or gravel complying with ASTM D448 for Size No. 57.

B. 3/4 Inch Graded Aggregate for Base: Sound, crushed stone or gravel complying with ASTM D448 for Size No. 8.

C. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C33/C33M for fine aggregate.

D. Sand for Joints: Fine, sharp, washed, natural sand or crushed tone with 100 percent passing No. 16 sieve and no more than 10 percent passing No. 200 sieve.

E. Herbicide: Commercial chemical for weed control, registered with the EPA. Provide in granular, liquid, or wettable powder form.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine surfaces indicated to receive unit paving assemblies, with Installer present, for compliance with requirements for installation tolerances, load tolerances, and other conditions affecting performance.

B. Where unit paving is to be installed over waterproofing or drainage mat assemblies, examine waterproofing and drainage installation, with waterproofing and drainage mat Installer present, for protection from paving operations, including areas where waterproofing and drainage system is turned up or flashed against vertical surfaces.

C. Proceed with installation only after substrates are within tolerances and have been inspected and accepted by the Installer, and unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Sweep concrete and other substrates to remove dirt, dust, debris, and loose particles.

B. Proof-roll prepared subgrade according to requirements in Section 312000 "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase and base course for unit pavers.

3.4 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.

B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.

C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

1. For concrete pavers, a block splitter may be used.

D. Joint Pattern: As indicated.

E. Tolerances:

1. Sloped Assemblies: Do not exceed 1/32-inch unit-to-unit offset from flush (lippage) or 1/8 inch in 10 feet from level, or indicated slope, for finisheda surface of paving.
2. Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches and 1/4 inch in 10 feet from level, or indicated slope, for finished surface of paving.

3.5 AGGREGATE SETTING-BED APPLICATIONS

A. Compact soil subgrade uniformly to at least 95 percent of ASTM D698 or ASTM D1557 laboratory density as required by Project application.

B. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by the Commissioner, and replace with compacted backfill or fill as directed.

C. Place aggregate subbase and base, compact by tamping with plate vibrator, or equipment suitable application and substrate to achieve compaction required where application and substrate will not allow the use of a plate vibrator, and screed to depth indicated.

D. Place leveling course and screed to a thickness of 1 inch, taking care that moisture content remains constant and density is loose and uniform until pavers are set and compacted.

E. Treat leveling course with herbicide to inhibit growth of grass and weeds.

F. Set pavers with hand tightened joints, a minimum joint width of 1/16 inch and a maximum of 1/8 inch, being careful not to disturb leveling base. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8 inch with pieces cut to fit from full-size unit pavers.

1. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.

G. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.

1. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches of uncompacted pavers adjacent to temporary edges.
2. Before ending each day's work, compact installed concrete pavers except for 36-inch width of uncompacted pavers adjacent to temporary edges (laying faces).
3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches of laying face.
4. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and cover leveling course on which pavers have not been placed with nonstaining plastic sheets to protect them from rain.

H. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.

I. Do not allow traffic on installed pavers until sand has been vibrated into joints.

J. Repeat joint-filling process 30 days later.

3.6 CORRECTIVE WORK, POINTING, AND CLEANING

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

END OF SECTION 321400

SECTION 323300 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Seating.
2. Tables.
3. Trash receptacles.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for installing pipe sleeves cast, installing anchor bolts cast, formed voids in concrete footings.
2. Section 312000 "Earth Moving" for excavation for installing concrete footings.

1.3 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

C. Samples for Initial Selection: For units with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish, not less than 6-inch- long linear components and 4-inch- square sheet components.

1. Include full-size Samples of bench, table, trash receptacle. Approved samples may be incorporated into the Work.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: Manufacturer's standard warranty for each site furnishing product.

B. Material Certificates: For site furnishings manufactured with preservative-treated wood.

1. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For site furnishings to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.8 WARRANTY

A. Manufacturer's Warranty:

1. World's Fair Bench Warranty: Manufacturer agrees to furnish replacement bench or bench components that fail within specified warranty period.Verify warranty periods.

a. Warranty Period, Ductile Iron Bench Components: 10 years from date of Substantial Completion.
b. Warranty Period, Recycled Plastic Lumber Components: 25 years from date of Substantial Completion.

2. Steel Table Warranty: Manufacturer agrees to furnish replacement table or table components that fail in materials and workmanship within specified warranty period.Verify warranty periods.

a. Warranty Period: 3 years from date of Substantial Completion.

3. Trash Container Warranty: Manufacturer agrees to furnish replacement trash container or trash container components that fail in materials and workmanship within specified warranty period.Verify warranty periods.

a. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Basis-of-Design Product: Subject to compliance with requirements, provide "1939 World's Fair Bench" with recycled plastic lumber slats as manufactured by Kenneth Lynch and Sons, or a comparable product by one of the following:.

1. Kevin G. Lindenlow Quality Site Furnishings.
2. All City Play Equipment, Inc.

3. Or approved equal.

B. Basis-of-Design Product: Subject to compliance with requirements, provide "46 inch Round, Diamond Patterh, Single Pedestal, In-Gound Mounted Table with Black, Powder Coated Base and Black Thermoplastic Finish" in 4 seat regular configuration and 3 seat ADA accessible configuration as indicated on the Drawings, and as manufactured by Anova, or comparable product by one of the following:

1. UltraSite/Playcore.
2. Modlar.
3. Or approved equal.

C. Basis-of-Design Product: Subject to compliance with requirements, provide "600 Trash Container" Black, East Coast Rust Proofed, Powder Coated Trash Receptacle as manufactured by Maglin, or comparable product by one of the following:

1. Belson Outdoors.
2. American Parks Company.
3. Or approved equal.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated; free of surface blemishes and complying with the following:

1. Rolled or Cold-Finished Bars, Rods, and Wire: ASTM B 211.
2. Extruded Bars, Rods, Wire, Profiles, and Tubes: ASTM B 221.
3. Structural Pipe and Tube: ASTM B 429/B 429M.
4. Sheet and Plate: ASTM B 209.
5. Castings: ASTM B 26/B 26M.

B. Steel and Iron: Free of surface blemishes and complying with the following:

1. Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53/A 53M, or electric-resistance-welded pipe complying with ASTM A 135/A 135M.
3. Tubing: Cold-formed steel tubing complying with ASTM A 500/A 500M.
4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513/A 513M, or steel tubing fabricated from steel complying with ASTM A 1011/A 1011M and complying with dimensional tolerances in ASTM A 500/A 500M; zinc coated internally and externally.
5. Sheet: Commercial steel sheet complying with ASTM A 1011/A 1011M.
6. Perforated Metal: From steel sheet not less than 0.075-inch nominal thickness; manufacturer's standard perforation pattern.
7. Expanded Metal: Carbon-steel sheets, deburred after expansion, and complying with ASTM F 1267.
8. Malleable-Iron Castings: ASTM A 47/A 47M, grade as recommended by fabricator for type of use intended.
9. Gray-Iron Castings: ASTM A 48/A 48M, Class 200.

C. Stainless Steel: Free of surface blemishes and complying with the following:

1. Sheet, Strip, Plate, and Flat Bars: ASTM A240/A240M or ASTM A666.
2. Pipe: Schedule 40 steel pipe complying with ASTM A 312/A 312M.
3. Tubing: ASTM A 554.

D. Fiberglass: Multiple laminations of glass-fiber-reinforced polyester resin with UV-light stable, colorfast, nonfading, weather- and stain-resistant, colored polyester gel coat, and with manufacturer's standard finish.

E. Plastic: Color impregnated, color and UV-light stabilized, and mold resistant.

1. Polyethylene: Fabricated from virgin plastic HDPE resin.

F. Anchors, Fasteners, Fittings, and Hardware: Stainless steel 316; commercial quality**,** tamperproof, vandal and theft resistant, concealed, recessed, and capped or plugged.

1. Angle Anchors: For inconspicuously bolting legs of site furnishings to on or below-grade substrate; extent as indicated.
2. Antitheft Hold-Down Brackets: For securing site furnishings to substrate; extent as indicated on Drawings.

G. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M; recommended in writing by manufacturer, for exterior applications.

H. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.

I. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:

1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil thick.
2. Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.

2.3 FABRICATION

A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended, so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

D. Preservative-Treated Wood Components: Complete fabrication of treated items before treatment if possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces.

E. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

F. Factory Assembly: Factory assemble components to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.4 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISHES

A. Powder-Coat Finish: Manufacturer's standard polyester powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.6 STEEL AND GALVANIZED-STEEL FINISHES

A. Powder-Coat Finish: Manufacturer's standard polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.7 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run directional finishes with long dimension of each piece.
2. Directional Satin Finish: ASTM A480/A480M, No 4.
3. Dull Satin Finish: ASTM A480/A480M, No. 6.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and securely anchored and positioned at locations indicated on Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

F. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic groutor anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION 323300

SECTION 329113 - SOIL PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section includes planting soils specified by composition of the mixes.

1.3 DEFINITIONS

A. AAPFCO: Association of American Plant Food Control Officials.

B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.

C. CEC: Cation exchange capacity.

D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.

E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.

F. Imported Soil: Soil that is transported to Project site for use.

G. Layered Soil Assembly: A designed series of planting soils, layered on each other, that together produce an environment for plant growth.

H. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.

I. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.

J. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."

K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

L. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.

M. SSSA: Soil Science Society of America.

N. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

O. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

P. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.

Q. USCC: U.S. Composting Council.

R. The New York State Department of Agriculture Markets.

S. NYSDEC: The New York State Department of Environmental Conservation.

T. OSHA: The Occupational Safety and Health Administration.

U. EPA: The Environmental Protection Agency.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include recommendations for application and use.
2. Include test data substantiating that products comply with requirements.
3. Include sieve analyses for aggregate materials.
4. Material Certificates: For each type of imported soil and soil amendment and fertilizer before delivery to the site, according to the following:

    a. Manufacturer's qualified testing agency's certified analysis of standard products.
    b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
    c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.

C. Samples: For each bulk-supplied material, 1-quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample must be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For each testing agency.

B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.

C. Field quality-control reports.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

1.9 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on existing, on-site soil and imported soil.

1. Notify Commissioner seven days in advance of the dates and times when laboratory samples will be taken.

B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.

1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.10 SOIL-SAMPLING REQUIREMENTS

A. General: Extract soil samples according to requirements in this article.

B. Sample Collection and Labeling: Have samples taken and labeled by soil scientist (RPSS) registered by the National Society of Consulting Soil Scientists or New York state-certified, -licensed, or -registered soil scientist under the direction of the testing agency.

1. Number and Location of Samples: Minimum of eight representative soil samples where directed by Commissioner for each soil to be used or amended for landscaping purposes.
2. Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing and Sampling Soils."
3. Division of Samples: Split each sample into two, equal parts. Send half to the testing agency and half to Commissioner for records.
4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.11 TESTING REQUIREMENTS

A. General: Perform tests on soil samples according to requirements in this article.

B. Physical Testing:

1. Soil Texture: Soil-particle, size-distribution analysis by the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":

   a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
   b. Hydrometer Method: Report percentages of sand, silt, and clay.

2. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
3. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
4. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85% compaction according to ASTM D 698 (Standard Proctor).

C. Chemical Testing:

1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3-Chemical Methods."
2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1- Physical and Mineralogical Methods."
3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.

D. Fertility Testing: Soil-fertility analysis according to standard laboratory protocol of SSSA NAPT NEC-67, including the following:

1. Percentage of organic matter.
2. CEC, calcium percent of CEC, and magnesium percent of CEC.

3. Soil reaction (acidity/alkalinity pH value).
4. Buffered acidity or alkalinity.
5. Nitrogen ppm.
6. Phosphorous ppm.
7. Potassium ppm.
8. Manganese ppm.
9. Manganese-availability ppm.
10. Zinc ppm.
11. Zinc availability ppm.
12. Copper ppm.
13. Sodium ppm and sodium absorption ratio.
14. Soluble-salts ppm.
15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
16. Other deleterious materials, including their characteristics and content of each.

E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."

F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.

1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. for 6-inch depth of soil**.**
2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 6-inch depth of soil.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with The New York State Department of Agriculture Markets, The New York State Department of Environmental Conservation, The Occupational Safety and Health Administration, and The Environmental Protection Agency, if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Do not move or handle materials when they are wet or frozen.
4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED BY COMPOSITION

A. General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.

B. Planting-Soil Type: Existing, on-site surface soil, with the duff layer, if any, retained; modified to produce viable planting soil. Blend existing, on-site surface soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

1. Ratio of Loose Compost to Soil: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.
2. Ratio of Loose Wood Derivatives Soil: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.
3. Weight of Lime: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.
4. Weight of Sulfur or Iron Sulfate: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.
5. Weight of Agricultural Gypsum: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.
6. Weight of Superphosphate: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.
7. Weight of Commercial Fertilizer: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.
8. Weight of Slow-Release Fertilizer: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.

C. Planting-Soil Type : Imported, naturally formed soil from off-site sources and consisting of sandy loam, loam, silt loam, loamy sand or sand soil according to USDA textures; and modified to produce viable planting soil.

1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass.
2. Additional Properties of Imported Soil before Amending: Soil reaction of pH 6 to 7 and minimum of 2 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration.
3. Unacceptable Properties: Clean soil of the following:

   a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
   b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 8 percent by dry weight of the imported soil.

c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 2 inches in any dimension.

4. Amended Soil Composition: Blend imported, unamended soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

a. Ratio of Loose Compost to Soil: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.
b. Ratio of Loose Wood Derivatives to Soil: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.
c. Weight of Lime: To be determined by volume and as recommended by soil Testing Agency as approved by the Commissioner.
d. Weight of Iron Sulfate: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.
e. Weight of Agricultural Gypsum: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.
f. Weight of Superphosphate: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.
g. Weight of Commercial Fertilizer: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.
h. Weight of Slow-Release Fertilizer: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.

D. Planting-Soil Type: Manufactured soil consisting of manufacturer's basic topsoil, and sandy loam according to USDA textures, blended in a manufacturing facility with sand, stabilized organic soil amendments, and other materials to produce viable planting soil.

1. Additional Properties of Manufacturer's Basic Soil before Amending: Soil reaction of pH 6 to 7 and minimum of 2, percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration.
2. Unacceptable Properties: Manufactured soil must not contain the following:

a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 5 percent by dry weight of the manufactured soil.
c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 1-1/2 inches in any dimension.

3. Blend manufacturer's basic soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

a. Ratio of Loose Compost to Soil: To be determined by volume and as recommended by Testing Agency as approved by the Commissioner.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.
2. Class: O, with a minimum of 95 percent passing through a No. 8 sieve and a minimum of 55 percent passing through a No. 60 sieve.
3. Form: Provide lime in form of ground dolomitic limestone, calcitic limestone, or mollusk shells as recommended by Testing Agency as approved by the Commissioner.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Perlite: Horticultural perlite, soil amendment grade.

E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.

F. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:

1. Feedstock: Limited to leaves.
2. Reaction: pH of 5.5 to 8.
3. Soluble-Salt Concentration: Less than 4 dS/m.
4. Moisture Content: 35 to 55 percent by weight.
5. Organic-Matter Content: 30 to 65 percent of dry weight.
6. Particle Size: Minimum of 98 percent passing through a 3/4 inch sieve.

B. Wood Derivatives: Shredded and composted, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

1. Partially Decomposed Wood Derivatives: In lieu of shredded and composted wood derivatives, mix shredded and partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. of loose sawdust or ground bark.

2.4 FERTILIZERS

A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

D. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 GENERAL

A. Place planting soil and fertilizers according to requirements in other Specification Sections.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

C. Proceed with placement only after unsatisfactory conditions have been corrected.

3.3 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

A. Excavation: Excavate soil from designated area(s) to a depth of 6 inches and stockpile until amended.

B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

C. Unsuitable Materials: Clean soil to contain a maximum of 8 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.

D. Screening: Pass unamended soil through a 2-inch sieve to remove large materials.

3.4 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Subgrade Preparation: Till subgrade to a minimum depth of 18 inches. Remove stones larger than 3 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off City of New York's property.

1. Apply, add soil amendments, and mix approximately half the thickness of unamended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

C. Mixing: Spread unamended soil to total depth indicated on Drawings, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

1. Amendments: Apply soil amendments**,** except compost, and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.

a. Mix lime and sulfur with dry soil before mixing fertilizer.
b. Mix fertilizer with planting soil no more than seven days before planting.

2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

D. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698 and tested in-place except where a different compaction value is indicated on Drawings.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.5 PLACING MANUFACTURED PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply manufactured soil on-site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Subgrade Preparation: Till subgrade to a minimum depth of 18 inches. Remove stones larger than 3 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off City of New York's property.

1. Apply approximately half the thickness of planting soil over prepared, loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

C. Application: Spread planting soil to total depth indicated on Drawings, but not less than required to meet finish grades after natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

1. Lifts: Apply planting soil in lifts not exceeding 12 inches in loose depth for material compacted by compaction equipment, and not more than 6 inches in loose depth for material compacted by hand-operated tampers.

D. Compaction: Compact each lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698 except where a different compaction value is indicated on Drawings.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.6 BLENDING PLANTING SOIL IN PLACE

A. General: Mix amendments with in-place, unamended soil to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Preparation: Till unamended, existing soil in planting areas to a minimum depth of of 18 inches. Remove stones larger than 3 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off City of New York's property.

C. Mixing: Apply soil amendments, except compost, and fertilizer, if required, evenly on surface, and thoroughly blend them into full depth of unamended, in-place soil to produce planting soil.

1. Mix lime and sulfur with dry soil before mixing fertilizer.
2. Mix fertilizer with planting soil no more than seven days before planting.

D. Compaction: Compact blended planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698 except where a different compaction value is indicated on Drawings.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.7 APPLYING COMPOST TO SURFACE OF PLANTING SOIL

A. Application: Apply compost component of planting-soil mix to surface of in-place planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Finish Grading: Grade surface to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform the following tests and inspections:

1. Compaction: Test planting-soil compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing according to ASTM D 698. Space tests at no less than one for each 1000 sq. ft. of in-place soil or part thereof.

C. Soil will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

3.9 PROTECTION

A. Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant Protection."

B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Foot traffic.
5. Erection of sheds or structures.
6. Impoundment of water.
7. Excavation or other digging unless otherwise indicated.

C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Commissioner and replace contaminated planting soil with new planting soil.

3.10 CLEANING

A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.

B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off City of New York's property unless otherwise indicated.

1. Dispose of excess subsoil and unsuitable materials on-site where directed by the Commissioner.

END OF SECTION 329113

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Turf renovation.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" and drawing designations for planting soils.

E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

C. Product Certificates: For fertilizers, from manufacturer.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures for maintenance of turf during a calendar year.

1.8 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.10 FIELD CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.

1. Sod may be laid at any time except the months of June and July providing the ground is not frozen.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

A. Turfgrass Sod: Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding, and complying with requirements of the New York City Parks Department" Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.

B. Turfgrass Species: Provide turfgrass species to match existing Species, and as directed by the Commissioner and approved by the New York City Parks Department.

2.2 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition:

   a. 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
   b. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition:

   a. 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
   b. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Commissioner and replace with new planting soil.

3.3 PREPARATION

A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.4 TURF AREA PREPARATION

A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation."

B. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.

1. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. Before planting, obtain Commissioner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.5 TURF RENOVATION

A. Renovate existing turf where indicated.

B. Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
2. Install new planting soil as required.

C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

D. Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

E. Mow, dethatch, core aerate, and rake existing turf.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off City of New York's property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

I. Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

1. Soil Amendment(s): According to requirements of Section 329113 "Soil Preparation." .
2. Initial Fertilizer: Commercial fertilizer or slow-release fertilizer applied according to manufacturer's recommendations.

J. Water newly planted areas and keep moist until new turf is established.

3.6 TURF ESTABLISHMENT

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.

2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow bentgrass to a height of 1/2 inch or less.
2. Mow bermudagrass to a height of 1/2 to 1 inch.
3. Mow carpetgrass, centipedegrass, perennial ryegrass, orzoysiagrass to a height of 1 to 2 inches.
4. Mow Kentucky bluegrass, buffalograss, annual ryegrass, or chewings red fescue to a height of 1-1/2 to 2 inches.
5. Mow bahiagrass, turf-type tall fescue or St. Augustinegrass to a height of 2 to 3 inches.

D. Turf Postfertilization: Apply commercial fertilizer or slow-release fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.7 SATISFACTORY TURF

A. Turf installations must meet the following criteria as determined by the Commissioner:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
3. Satisfactory Plugged Turf: At end of maintenance period, the required number of plugs has been established as well-rooted, viable patches of grass, and areas between plugs are free of weeds and other undesirable vegetation.
4. Satisfactory Sprigged Turf: At end of maintenance period, the required number of sprigs has been established as well-rooted, viable plants, and areas between sprigs are free of weeds and other undesirable vegetation.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.8 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off City of New York's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Remove nondegradable erosion-control measures after grass establishment period.

3.9 MAINTENANCE SERVICE

A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Establishment" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:

1. Sodded Turf: 30 days from date of planting completion.

END OF SECTION 329200

SECTION 329300 - PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Plant materials.
2. Fertilizers.
3. Weed-control barriers.
4. Mulches.
5. Tree-stabilization materials.
6. Gravel maintenance edging materials and accessories.

B. Related Requirements:

1. Section 015639 "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.

1.3 COORDINATION

A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.6 ACTION SUBMITTALS

A. Product Data Submittals: For each product.

1. Plant Materials: Include quantities, sizes, quality, and verified sources for plant materials.

B. Samples for Verification: Actual sample of finished products for each of the following:

1. Organic Mulch: 1-quart volume of each organic mulch required; typical of the lot of material to be furnished, in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Provide an accurate representation of color, texture, and organic makeup.
2. Decorative Stone: 2 lb crushed decorative stone required; typical of the lot of material to be furnished and to match Species of boulders specified in Section 044200 "Exterior Stonework", in sealed plastic bags labeled with source of mulch. Provide accurate indication of color, texture, and makeup.
3. Drainage Gravel: 2 lb of gravel, in sealed plastic bags labeled with source of gravel. Sample must be typical of the lot of material to be delivered and installed on-site. Provide an accurate indication of color, texture, and makeup.
4. Weed-Control Barrier: 12 by 12 inches.
5. Root-Ball-Stabilization Device: One unit.
6. Gravel Maintenance Edging Materials and Accessories: Manufacturer's standard size, to verify finish selected.
7. Root Barrier: Width of panel by 12 inches.
8. Filter Fabric: 12 inch square.

C. Shop Drawings: Provide Shop Drawings for gravel maintenance edge to verify site conditions. Indicate site conditions, gravel maintenance edge and stakes, filter fabric, crushed stone, and organic mineral mulch.and adjacent conditions and contiguous assemblies.

1.7 INFORMATIONAL SUBMITTALS

A. Field Quality-Control Reports: Percolation tests for tree pits. Include the following:

1. Tree identification number matching the plans.
2. Date of test.
3. Time when water was added to tree pit to start percolation test.
4. Time with photo documentation showing increments of testing with water level in tree pit.
5. Identification of tester.

B. Qualification Statements: For landscape Installer.

C. Product Certificates: For each type of manufactured product, from manufacturer, and complying with manufacturer's certified analysis of standard products.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures for maintenance of plants during a calendar year.

1.9 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.

1. Installer's Field Supervision: Maintain an experienced full-time supervisor on Project site when work is in progress.

C. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

1. Selection of plants will be made by the Commissioner, who will tag plants at their place of growth before they are prepared for transplanting.

D. Measurements: Measure in accordance with ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

E. Plant Material Observation: Commissioner may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Commissioner may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Commissioner of sources of planting materials seven days in advance of delivery to site.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with The New York State Department of Agriculture Markets, The New York State Department of Environmental Conservation, The Occupational Safety and Health Administration, and The Environmental Protection Agency if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, or walkways and pavements; or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

C. Deliver bare-root stock plants within 24 hours of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.

D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.

G. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

H. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

I. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock. Soak roots that are in less than moist condition in water for two hours. Reject plants with dry roots.
2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
3. Do not remove container-grown stock from containers before time of planting.
4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1.11 FIELD CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting: Deciduous Trees and Shrubs: March 1 - May 1; Evergreen Trees and Shrubs:April 1 - May 15; Ground Cover: April 1 - June 15.
2. Fall Planting: Deciduous Trees and Shrubs: Octover 15 - December 1; Evergreen Trees and Shrubs: September 1 - October 1.

C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions in accordance with manufacturer's written instructions.

1.12 GUARANTY SERVICE

A. Provide all required planting maintenance, repairs or replacements for a period of Two years from Date of Substantial Completion.

1. Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than two years.
2. Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than two years.
3. Repair or replace plantings and accessories that fail in materials, workmanship, or growth.
4. Include the following remedial actions as a minimum:

a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of guaranty period.
c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.

PART 2 - PRODUCTS

2.1 PLANT MATERIALS

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; with tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); with crossing trunks; with cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Commissioner, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare in accordance with ANSI Z60.1.

D. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for plant.

E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to ensure symmetry in planting.

F. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but are not yet in bloom.

2.2 FERTILIZERS

A. Granular Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition:

   a. 0.75 lb/1000 sq. ft. 3 percent of actual nitrogen, 4 percent phosphorous, and 3 percent potassium, by weight.
   b. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

B. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and maximum of 5.5 percent inert material.

2.3 WEED-CONTROL BARRIERS

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum, composed of fibers inert to biological degradation and naturally resistant to chemicals, alkalis, and acids, formed into a stable network so that fibers retain their relative position.

B. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd.

2.4 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Shredded hardwood, or wood and bark chips.
2. Size Range: 3 inches maximum, 1/2 inch minimum.
3. Color: Natural.

B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through a 1-inch sieve; soluble-salt content of 2 to 5 dS/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

C. Decorative Stone: Hard, durable stone, washed free of loam, sand, clay, and other foreign substances, of the following type, size range, and color:

1. Type: Crushed stone or gravel to match boulder Species and color specified in Section 044200 "Exterior Stonework".
2. Size Range: 1/4 inch maximum.

D. Drainage Gravel: Drainage Gravel: Washed, sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.

2.5 TREE-STABILIZATION MATERIALS

A. Trunk-Stabilization Materials:

1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
2. Wood Deadmen: Timbers measuring 8 inches in diameter and 48 inches long, treated with specified wood pressure-preservative treatment.
3. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.
4. Guys and Tie Wires: ASTM A641/A641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch in diameter.
5. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
6. Guy Cables: Five-strand, 3/16-inch- diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches long, with two 3/8-inch galvanized eyebolts.
7. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.
8. Staking-and-Guying Devices: Stake or anchor and adjustable tie systems to secure each new planting by plant stem; sized as indicated and in accordance with manufacturer's written instructions.

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Arborbrace.
      2) J. R. Partners.
      3) MacLean Power Systems.
      4) Or approved equal.

B. Root-Ball Stabilization Materials:

1. Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated; stakes pointed at one end.
2. Wood Screws: ASME B18.6.1.

3. Root-Ball Stabilization Devices: At- or below-grade stabilization systems to secure each new planting by root ball and that do not encircle the trunk; sized in accordance with manufacturer's written instructions unless otherwise indicated.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Border Concepts, Inc.
        2) MacLean Power Systems.
        3) Tree Staple, Inc.
        4) Or approved equal.

2.6 GRAVEL MAINTENANCE EDGINGS

A. Stainless Steel Edging: ASTM A240 1, Type 316, fabricated in standard lengths with interlocking sections with loops stamped from face of sections to receive stakes.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. J. D. Russell Company (The).
    b. Permaloc Corporation.
    c. Sure-loc Edging Corporation.
    d. Or approved equal.

2. Edging Size: 1/4 inch thick by 16 inches deep.
3. Stakes: Stainless Steel Type 316, , approximately 1-1/2 inches wide by 24 inches long.
4. Finish: No. 3.

2.7 MISCELLANEOUS PRODUCTS

A. Root Barrier: Black, molded, modular panels 24 inches high (deep), 85 mils thick, and with vertical root deflecting ribs protruding 3/4 inch out from panel surface; manufactured with minimum 50 percent recycled polyethylene plastic with UV inhibitors.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. DeepRoot Green Infrastructure, LLC.
    b. NDS Inc.
    c. Villa Root Barrier; Villa Landscape Products.
    d. Or approved equal.

B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix in accordance with manufacturer's written instructions.

C. Filter Fabric: Nonwoven geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EXAMINATION

A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
3. Suspend planting operations during periods of excessive soil moisture until moisture content reaches acceptable levels to attain required results.
4. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove soil and contamination as directed by Commissioner and replace with new planting soil.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Commissioner's acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Lay out plants at locations directed by Commissioner. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

3.4 PLANTING AREA ESTABLISHMENT

A. General: Prepare planting area for soil placement and mix planting soil in accordance with Section 329113 "Soil Preparation."

B. Placing Planting Soil: Blend planting soil in place.

C. Before planting, obtain Commissioner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

D. Application of Mycorrhizal Fungi: At time directed by Commissioner, broadcast dry product uniformly over prepared soil at application rate in accordance with manufacturer's written instructions.

3.5 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits.

1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
2. Excavate approximately three times as wide as ball diameter for balled and burlapped, balled and potted,container-grown,fabric bag-grown stock.
3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
4. Do not excavate deeper than depth of root ball, measured from the root flare to the bottom of root ball.
5. If area under the plant was initially dug too deep, add soil to raise it to correct level and thoroughly tamp the added soil to prevent settling.
6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
7. Maintain supervision of excavations during working hours.
8. Keep excavations covered or otherwise protected overnight, after working hours, when unattended by Installer's personnel.
9. If drain tile is indicated on Drawings or required under planting areas, excavate to top of porous backfill over tile.

B. Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated.

C. Obstructions: Notify Commissioner if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch- diameter holes, 24 inches apart, into free-draining strata or to depth of 10 ft., whichever is less, and backfill with free-draining material.

D. Drainage: Notify Commissioner if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.6 TREE, SHRUB, AND VINE PLANTING

A. Inspection: At time of planting, verify that root flare is visible at top of root ball in accordance with ANSI Z60.1. If root flare is not visible, remove soil in a level manner from root ball to where the top-most root emerges from the trunk. After soil removal to expose root flare, verify that root ball still meets size requirements.

B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.

1. Backfill: Planting soil For trees, use excavated soil for backfill**.**
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Distribute granular fertilizer around each planting pit when pit is approximately one-half filled. Do not place in bottom of the hole.

   a. Quantity: According to manufactureres written directions.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Balled and Potted and Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.

1. Backfill: Planting soil. For trees, use excavated soil for backfill**.**
2. Carefully remove root ball from container without damaging root ball or plant.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Distribute granular fertilizer around each planting pit when pit is approximately one-half filled. Do not place in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. Fabric Bag-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.

1. Backfill: Planting soil. For trees, use excavated soil for backfill.
2. Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

4. Distribute granular fertilizer around each planting pit when pit is approximately one-half filled. Do not place in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

F. Bare-Root Stock: Set and support each plant in center of planting pit or trench with root flare 2 inches above adjacent finish grade.

1. Backfill: Planting soil. For trees, use excavated soil for backfill.
2. Spread roots without tangling or turning toward surface. Plumb before backfilling, and maintain plumb while working.
3. Carefully work backfill in layers around roots by hand. Bring roots into close contact with the soil.
4. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
5. Distribute granular fertilizer around each planting pit when pit is approximately one-half filled. Do not place in bottom of the hole or touching the roots.
6. Continue backfilling process. Water again after placing and tamping final layer of soil.

G. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of root ball.

3.7 MECHANIZED TREE-SPADE PLANTING

A. Plant trees with approved mechanized tree spade at designated locations. Do not use tree spade to move trees larger than maximum size allowed for similar field-grown, balled-and-burlapped, root-ball diameter in accordance with ANSI Z60.1, or trees larger than manufacturer's maximum size recommendation for tree spade being used, whichever is smaller.

B. Use same tree spade to excavate the planting hole as will be used to extract and transport the tree.

C. When extracting tree, center the trunk within the tree spade and move tree with solid ball of earth.

D. Cut exposed roots cleanly during transplanting operations.

E. Plant trees following procedures in "Tree, Shrub, and Vine Planting" Article.

F. Where possible, orient the tree in same direction as in its original location.

3.8 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines as directed by Commissioner.

C. Prune, thin, and shape trees, shrubs, and vines in accordance with standard professional horticultural and arboricultural practices. Unless otherwise indicated by Commissioner, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

D. Do not apply pruning paint to wounds.

3.9 INSTALLATION OF TREE-STABILIZATION MATERIALS

A. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:

1. Upright Staking and Tying:

a. Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend at least 72 inches above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
b. Stake trees with two stakes for trees up to 12 ft. high and 2-1/2 inches or less in caliper; three stakes for trees less than 14 ft. high and up to 4 inches in caliper. Space stakes equally around trees.

2. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
3. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

B. Trunk Stabilization by Staking and Guying: Install trunk stabilization as follows unless otherwise indicated on Drawings. Stake and guy trees more than 14 ft. in height and more than 3 inches in caliper unless otherwise indicated.

1. Site-Fabricated, Staking-and-Guying Method: Install no fewer than three guys spaced equally around tree.

a. Securely attach guys to stakes 30 inches long, driven to grade. Adjust spacing to avoid penetrating root balls or root masses. Provide turnbuckle for each guy wire and tighten securely.
b. For trees more than 6 inches in caliper, anchor guys to wood deadmen buried at least 36 inches below grade. Provide turnbuckle for each guy wire and tighten securely.
c. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
d. Support trees with guy cable, connected to brass grommets of tree-tie webbing at contact points with tree trunk and reaching to turnbuckle or compression spring. Allow enough slack to avoid rigid restraint of tree.
e. Attach flags to each guy wire, 30 inches above finish grade.
f. Paint turnbuckles with luminescent white paint.

2. Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and in accordance with manufacturer's written instructions.

C. Root-Ball Stabilization: Install at- or below-grade stabilization system to secure each new planting by root ball unless otherwise indicated.

1. Wood Hold-Down Method: Place vertical stakes against side of root ball and drive them into subsoil; place horizontal wood hold-down stake across top of root ball and screw at each end to one of vertical stakes.

    a. Install stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation. Saw stakes off at horizontal stake.
    b. Install screws through horizontal hold-down and penetrating at least 1 inch into stakes. Predrill holes if necessary to prevent splitting wood.
    c. Install second set of stakes on other side of root trunk for larger trees.

2. Root-Ball Stabilization Device: Install root-ball stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and in accordance with manufacturer's written instructions.

3.10 INSTALLATION OF ROOT BARRIER

A. Install root barrier where trees are planted within 60 inches of paving or other hardscape elements, such as walls, curbs, and walkways, unless otherwise indicated on Drawings.

B. Align root barrier vertically, and run it linearly along and adjacent to paving or other hardscape elements to be protected from invasive roots.

C. Install root barrier continuously for distance of 60 inches in each direction from tree trunk, for total distance of 10 ft. per tree. If trees are spaced closer, use single continuous piece of root barrier.

1. Position top of root barrier in accordance with manufacturer's written instructions.
2. Overlap root barrier minimum of 12 inches at joints.
3. Do not distort or bend root barrier during construction activities.
4. Do not install root barrier surrounding the root ball of tree.

3.11 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.12 INSTALLATION OF MULCHES

A. Install weed-control barriers before mulching in accordance with manufacturer's written instructions. Completely cover area to be mulched, overlapping edges minimum of 12 inches, and secure seams with galvanized pins.

B. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees and Treelike Shrubs in Turf Areas: Apply mulch ring of 3-inch average thickness, with 36-inch radius around trunks or stems. Do not create a mulch cone or place mulch within 6 inches of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 3-inch average thickness of organic mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 6 inches of trunks or stems.

3.13 INSTALLATION OF MAINTENANCE EDGINGS

A. Gravel Maintenance Edging: Install edging where indicated in accordance with approved Shop Drawings.. Anchor with stainless steel stakes spaced approximately 36 inches apart, driven below top elevation of edging.

B. Install filter fabric, drainage gravel and decorative stone in accordance with approved Shop Drawings.

3.14 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.15 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Perform tree pit percolation tests.
2. Tree pit construction will be considered defective if it does not pass percolation tests and inspections.
3. Do not proceed with planting in tree pits until satisfactory percolation is demonstrated.

C. Prepare test and inspection reports.

3.16 CORRECTIVE WORK AND REPLACEMENT

A. Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Commissioner.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Commissioner.

B. Remove and replace trees that are more than 25 percent dead or in unhealthy condition before end of corrections period or are damaged during construction operations that Commissioner determines are incapable of restoring to normal growth pattern.

1. Provide new trees of same size as those being replaced for each tree of 6 inches or smaller in caliper size.
2. Provide one new tree(s) of 6-inch caliper size for each tree being replaced that measures more than 6 inches in caliper size.
3. Species of Replacement Trees: Same species being replaced.

3.17 CLEANING AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off City of New York's property.

C. Protect plants from damage due to landscape operations and operations of other subcontractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

D. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

END OF SECTION 329300

SECTION 331415 - SITE WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Water-distribution piping and related components outside the building.

1.3 DEFINITIONS

A. CDA: Copper Development Association.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

C. PA: Polyamide (nylon) plastic.

D. PE: Polyethylene plastic.

E. PP: Polypropylene plastic.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
2. Include diagrams for power, signal, and control wiring for alarms.

1.6 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare piping, valves, meters, backflow prevention devices, and fire hydrants according to the following:

1. Ensure that piping, valves, meters, backflow prevention devices, and fire hydrants are dry and internally protected against rust and corrosion.
2. Protect threaded ends and flange faces against damage.
3. Set piping, valves, meters, backflow prevention devices, and fire hydrants in best position for handling and to prevent rattling.

B. During Storage: Use precautions for piping, valves, meters, backflow prevention devices, and fire hydrants according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle products if size requires handling by crane or lift. Rig products to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.8 COORDINATION

A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.

B. Comply with standards of the NYC Plumbing Code, and the NYC Department of Environmental Protection for domestic water-service piping, including materials, installation, testing, and disinfection.

C. Comply with standards of the NYC Plumbing Code, the NYC Fire Department and the NYC Department of Environmental Protection for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

D. Piping materials to bear label, stamp, or other markings of specified testing agency.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 by a qualified testing agency and marked for intended location and application.

F. Comply with ASTM F645 for selection, design, and installation of thermoplastic water piping.

G. Comply with FM Approvals' "Approval Guide" and/or UL's "Fire Protection Equipment Directory" for fire-suppression water-service products.

H. Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-suppression water-service piping.

I. All piping and appurtenances intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), the requirements of the NYC Construction Codes, and with NSF 61/NSF 372 or are certified in compliance with NSF 61/NSF 372 by an ANSI-accredited third-party certification body, that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

2.2 PIPING MATERIALS

A. Comply with requirements in "Piping Applications" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and service sizes.

B. Potable-water piping and components comply with NSF 14, NSF 61, and NSF 372. Include marking "NSF-pw" on piping.

2.3 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe:

1. AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. AWWA C104/A21.4 cement mortar-lined.

B. Push-on-Joint, Ductile-Iron Pipe:

1. AWWA C151/A21.51, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. AWWA C104/A21.4 cement mortar-lined.

2.4 GATE VALVES

A. Gate Valves - AWWA, Cast Iron:

1. Source Limitations: Obtain gate valves - AWWA, cast iron, from single manufacturer.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EARTHWORK

A. Comply with excavating, trenching, and backfilling requirements in Section 312000 "Earth Moving."

3.3 PIPING APPLICATIONS

A. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used unless otherwise indicated.

B. Do not use flanges or unions for underground piping.

C. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Provide a continuous bare copper or aluminum tracer wire not less than 0.10 inch in diameter in sufficient length over each separate run of nonmetallic pipe.

3.5 INSTALLATION OF PIPING

A. Water-Main Connection:

1. Arrange with utility company for tap of size and in location indicated in water main.
2. Tap water main in accordance with requirements of water utility company and of size and in location indicated.

B. Make connections larger than NPS 2 with tapping machine according to the following:

1. Install tapping sleeve and tapping valve in accordance with MSS SP-60.
2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.

C. Make connections NPS 2 and smaller with drilling machine according to the following:

1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
4. Install corporation valves into service-saddle assemblies.
5. Install manifold for multiple taps in water main.
6. Install curb valve in water-service piping with head pointing up and with service box.

D. Comply with NFPA 24 for fire-service-main piping materials and installation.

1. Install PE corrosion-protection encasement in accordance with ASTM A674 or AWWA C105/A21.5.
2. Install copper tube and fittings in accordance with CDA's "Copper Tube Handbook."

E. Install ductile-iron, water-service piping in accordance with AWWA C600 and AWWA M41.

1. Install PE corrosion-protection encasement in accordance with ASTM A674 or AWWA C105/A21.5.

F. Install PE pipe in accordance with ASTM D2774 and ASTM F645.

G. Install PVC, AWWA pipe in accordance with ASTM F645 and AWWA M23.

H. Install fiberglass AWWA pipe in accordance with AWWA M45.

I. Bury piping with depth of cover over top at least 30 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:

1. Under Driveways: With at least 36 inches of cover over top.
2. Under Railroad Tracks: With at least 48 inches of cover over top.
3. In Loose Gravelly Soil and Rock: With at least 12 inches of additional cover.

J. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.

K. Extend water-service piping and connect to water-supply source and building water-piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building water-piping systems when those systems are installed.

L. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

M. Comply with Section 211000 "Water-Based Fire-Suppression Systems" for fire-suppression-water piping inside the building.

N. Comply with Section 221116 "Domestic Water Piping" for potable-water piping inside the building.

3.6 JOINT CONSTRUCTION

A. Make pipe joints according to the following:

1. Copper-Tubing, Pressure-Sealed Joints: Join copper tube and pressure-seal fittings with tools and procedures recommended by pressure-seal-fitting manufacturer. Leave insertion marks on pipe after assembly.
2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
3. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
4. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts in accordance with coupling manufacturer's written instructions.
5. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners in accordance with fitting manufacturer's written instructions.
6. PVC Piping Gasketed Joints: Use joining materials in accordance with AWWA C900. Construct joints with elastomeric seals and lubricant in accordance with ASTM D2774 or ASTM D3139 and pipe manufacturer's written instructions.
7. Fiberglass Piping Bonded Joints: Use adhesive and procedure recommended by piping manufacturer.

3.7 INSTALLATION OF ANCHORAGE

A. Anchorage: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

1. Concrete thrust blocks.
2. Locking mechanical joints.
3. Set-screw mechanical retainer glands.
4. Bolted flanged joints.
5. Heat-fused joints.
6. Pipe clamps and tie rods.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: In accordance with AWWA C600.
2. Gasketed-Joint, PVC Water-Service Piping: In accordance with AWWA M23.
3. Bonded-Joint Fiberglass, Water-Service Piping: In accordance with AWWA M45.
4. Fire-Service-Main Piping: In accordance with NFPA 24.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.8 INSTALLATION OF VALVES

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.

C. UL-Listed or FM Global-Approved Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.

D. UL-Listed or FM Global-Approved Valves Other Than Gate Valves: Comply with NFPA 24.

E. MSS Valves: Install as component of connected piping system.

F. Comply with requirements for concrete piers in Section 033000 "Cast-in-Place Concrete" for support of valves and piping not direct buried.

3.9 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.

1. Increase pressure in 50 psig increments and inspect each joint between increments. Hold at test pressure for one hour; decrease to 0 psig. Slowly increase again to test pressure and hold for one more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.10 IDENTIFICATION

A. Install continuous underground warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 312000 "Earth Moving."

B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel.

3.11 CLEANING

A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by the NYC Plumbing Code or, if method is not prescribed, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
3. Use purging and disinfecting procedure prescribed by the NYC Plumbing Code or, if method is not prescribed, use procedure described in AWWA C651 or do as follows:

a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.

b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for three hours.
c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
d. Submit water samples in sterile bottles. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION 331415

SECTION 334200 - STORMWATER CONVEYANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following documents apply to all required work for the Project: (1) the Contract Drawings, (2) the Specifications, (3) the General Conditions, (4) the Addendum and (5) the Contract "City of New York Standard Construction Contract."

1.2 SUMMARY

A. Section Includes:

1. Ductile-iron culvert pipe and fittings.
2. Ductile-iron, pressure pipe and fittings.
3. PE pipe and fittings.
4. Cleanouts.
5. Manholes.
6. Catch basins.
7. Stormwater detention structures.
8. Pipe outlets.

1.3 DEFINITIONS

A. FRP: Fiberglass-reinforced plastic.

1.4 SUBMITTAL PROCEDURES

A. Refer to DDC General Conditions Section 013300 "Submittal Procedures."

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings:

1. Manholes: Include plans, elevations, sections, details, frames, and covers.
2. Catch basins and stormwater inlets. Include plans, elevations, sections, details, frames, covers, and grates.

3. Stormwater Detention Structures: Include plans, elevations, sections, details, frames, covers, design calculations, and concrete design-mix reports.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of ductile-iron pipe and fitting, from manufacturer.

1.7 QUALITY ASSURANCE

A. Refer to DDC General Conditions Section 014000 "Quality Requirements."

B. Piping materials must bear label, stamp, or other markings of specified testing agency.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle manholes in accordance with manufacturer's written rigging instructions.

D. Handle catch basins and stormwater inlets in accordance with manufacturer's written rigging instructions.

1.9 FIELD CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by City of New York or others unless permitted under the following conditions and then only after arranging to provide temporary service in accordance with requirements indicated:

1. Notify Commissioner no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Commissioner's written permission.

PART 2 - PRODUCTS

2.1 DUCTILE-IRON, PRESSURE PIPE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Ductile Iron Pipe.
2. McWane Ductile.
3. U.S. Pipe and Foundry Company.
4. Or approved equal.

B. Ductile-Iron, Push-on-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.

2. Ductile-Iron Fittings: AWWA C110/A21.10, push-on-joint ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
3. Gaskets: AWWA C111/A21.11, rubber.
4. Description: Ductile Iron Sewer pipe must consist of bell and spigot type Ductile iron pipe sections with Field Lok Gasket joints and must conform to the ANSI C151 and American Water Works Association A21.51, Thickness Class 56. Pipe must be laid true to line and grade with bells upstream.

2.2 CORRUGATED-PE PIPE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Emco Industrial Plastics.
2. dvanced Drainage Systems, Inc. (ADS) Staybrook Industrial Area, Ludlow, MA 01056.
3. Industrial Specialties Mfg, Inc.
4. Or approved equal.

B. Source Limitations: Obtain corrugated-PE pipe and fittings from single manufacturer.

C. Corrugated-PE Drainage Pipe and Fittings NPS 3 to NPS 10: AASHTO M 252, Type S, with smooth waterway for coupling joints.

D. Corrugated-PE Pipe and Fittings NPS 12 to NPS 60: AASHTO M 294, Type S, with smooth waterway for coupling joints.

E. Corrugated-PE Silttight Couplings: PE sleeve with ASTM D1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.

F. Corrugated-PE Soiltight Couplings: AASHTO M 294, corrugated, matching pipe and fittings.

G. Sizes 4-36 in (N-12) must have a full circular cross-section, with an outer corrugated pipe wall and an essentially smooth inner wall (waterway). Corrugations for these sizes may be either annular or spiral. All sizes must conform to the AASHTO classification "Type S" (smooth waterway) or "Type SP" (smooth waterway and Class 2 perforations) as specified. Pipe manufactured for this specification must comply with requirements for test methods, dimensions, and markings found in AASHTO designations M252 and M294. Pipe and fittings must be made from Virgin PE compounds which conform with the requirements of cell class 324420C as defined and described in ASTM D3350.

H. The minimum parallel plate stiffness values when tested in accordance with ASTM D2412 must be as follows:

Diameter	Pipe Stiffness
4" (100 mm)	50 psi (340 kPa)
6" (150mm)	50 psi (340 kPa)
8" (200mm)	50 psi (340 kPa)
12" (300mm)	50 psi (340 kPa)
18" (450 mm)	40 psi (280 kPa)
24” (600 mm)	34 psi (235 kPa)
36” (900 mm)	22 psi (150 kPa)

I. The fittings must not reduce or impair the overall integrity or function of the pipe line. Common corrugated fittings may be either molded or fabricated. Common corrugated fittings include in-line joint fittings, such as couplers and reducers, and branch or complimentary assembly fittings such as tees, wyes, and end caps. These fittings may be installed by various methods, such as snap-on, screw-on, bell and spigot, and wrap around. Couplings must provide sufficient longitudinal strength to preserve pipe alignment and prevent separation at the joints.

J. Only fittings supplied or recommended by the pipe manufacturer must be used. Where designated on the plans, a neoprene or rubber gasket must be supplied.

2.3 CLEANOUTS

A. Ductile-Iron Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. American Ductile Iron Pipe.
   b. McWane Ductile.
   c. U.S. Pipe and Foundry Company.
   d. Or approved equal.

2. Source Limitations: Obtain ductile-iron cleanouts from single manufacturer.
3. Description: Ductile Iron Sewer pipe must consist of bell and spigot type Ductile iron pipe sections with Field Lok Gasket joints, and must conform to the ANSI C151 and American Water Works Association A21.51, Thickness Class 56. Pipe must be laid true to line and grade with bells upstream.
4. Sewer Pipe Fitting and Riser to Cleanout: American National Standards Institute C151 and American Wat

2.4 DRAINS

A. Cast-Iron Area Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Jay R. Smith Mfg. Co.
   b. Josam Company.
   c. MIFAB, Inc.
   d. Neenah Foundry Company.
   e. Tyler Pipe; a subsidiary of McWane Inc.
   f. WATTS.
   g. Zurn Industries, LLC.
   h. Or approved equal

2. Source Limitations: Obtain cast-iron area drains from single manufacturer.
3. Description: ASME A112.6.3 gray-iron round body with anchor flange and round secured grate. Include bottom outlet with inside caulk or spigot connection, of sizes indicated.
4. Top-Loading Classification(s): Medium Duty and Heavy Duty.

2.5 MANHOLES

A. NYCDPR Manhole Type M-1

1. Concrete base: the concrete base must be mixed in the proportions of one part portland cement, two parts fine aggregate and four parts coarse aggregate, with the maximum size of stone limited to one inch (1"). Concrete must be "average concrete" 3,200psi.
2. Brick: All bricks used in the work must be new, sound, and hard burned throughout, and of uniform size and quality. If required, the brick must be culled immediately after they are brought on the work, and all bricks which are warped, cracked, or of improper quality must be removed. The proportion of bats permitted will be determined according to the character and location of the work in which they are to be used.
3. Mortar: The mortar must be composed of one (1) part of portland cement and a maximum of two (2) parts fine aggregate, with not more than 5% of the cement content of hydrated lime putty.
4. Ladder rungs must be constructed of copolymer polypropylene plastic manhole steps.

B. Standard Precast Concrete Manholes:

1. Description: ASTM C478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C990, bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP steps; FRP ladder; or ASTM A615/A615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D4101, PPASTM A615/A615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D4101, PP, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.
10. Adjusting Rings: Interlocking HDPE rings with level or sloped edge in thickness and diameter matching manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

C. Designed Precast Concrete Manholes:

1. Description: ASTM C913; designed in accordance with ASTM C890 for A-16 (AASHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for sealant joints.

2. Ballast: Increase thickness of one or more precast concrete sections or add concrete to manhole as required to prevent flotation.
3. Joint Sealant: ASTM C990, bitumen or butyl rubber.
4. Resilient Pipe Connectors: ASTM C923, cast or fitted into manhole walls, for each pipe connection.
5. Steps: Individual FRP steps or FRP ladder , wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.
6. Adjusting Rings: Interlocking HDPE rings with level or sloped edge in thickness and diameter matching manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
7. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope.

D. NYCDPR Type M-1 Leaf Manhole frames and covers: The manhole covers must be gray iron ASTM A-48, latest revision, Class 30 or better. All covers must be suitable for highway traffic, meeting the requirements for heavy duty H-20 loading, per AASHTO M306-10.

1. Bolt and key: Each cover must be furnished with two (2) locking bolts. Two (2) keys must be furnished per site.

E. Pre-cast Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch- minimum width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
2. Material: ASTM A536, Grade 60-40-18 ductile iron unless otherwise indicated.

2.6 CONCRETE

A. General: Cast-in-place concrete in accordance with ACI 318, ACI 350, and the following:

1. Cement: ASTM C150/C150M, Type II.
2. Fine Aggregate: ASTM C33/C33M, sand.
3. Coarse Aggregate: ASTM C33/C33M, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A1064/A1064M, steel, welded wire fabric, plain.

2.7 CATCH BASINS

A. NYCDPR Type C-2 drainage catch basins and D-2 drop inlets:

1. Concrete base: the concrete base must be mixed in the proportions of one part portland cement, two parts fine aggregate and four parts coarse aggregate, with the maximum size of stone limited to one inch (1"). Concrete must be "average concrete" 3,200psi.

2. Brick: All bricks used in the work must be new, sound, and hard burned throughout, and of uniform size and quality. If required, the brick must be culled immediately after they are brought on the work, and all bricks which are warped, cracked, or of improper quality must be removed. The proportion of bats permitted will be determined according to the character and location of the work in which they are to be used.
3. Mortar: The mortar must be composed of one (1) part of portland cement and a maximum of two (2) parts fine aggregate, with not more than 5% of the cement content of hydrated lime putty.
4. Ladder rungs must be constructed of copolymer polypropylene plastic manhole steps.

B. Standard Precast Concrete Catch Basins:

1. Description: ASTM C478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
3. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
5. Joint Sealant: ASTM C990, bitumen or butyl rubber.
6. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch- diameter frame and grate.
8. Steps: Individual FRP steps; FRP ladder; or ASTM A615/A615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D4101, PP , wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches.
9. Pipe Connectors: ASTM C923, resilient, of size required, for each pipe connecting to base section.

C. Designed Precast Concrete Catch Basins: ASTM C913, precast, reinforced concrete; designed in accordance with ASTM C890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for joint sealants.

1. Joint Sealants: ASTM C990, bitumen or butyl rubber.
2. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
3. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch- diameter frame and grate.
4. Steps: Individual FRP steps; FRP ladder; or ASTM A615/A615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D4101, PP , wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals.
5. Pipe Connectors: ASTM C923 (ASTM C923M), resilient, of size required, for each pipe connecting to base section.

D. NYCDPR Type C-2 drainage catch basins and D-2 drop inlets:

E. Frames and Grates: ASTM A536, Grade 60-40-18, ductile iron designed for A-16 (AASHTO HS20-44), structural loading. Include flat grate with small square or short-slotted drainage openings.
1. Size: 24 by 24 inches minimum unless otherwise indicated.

2. Grate Free Area: Approximately 50 percent unless otherwise indicated.

F. Frames and Grates: ASTM A536, Grade 60-40-18, ductile iron designed for A-16 (AASHTO HS20-44), structural loading. Include 24-inch ID by 7- to 9-inch riser with 4-inch- minimum width flange, and 26-inch- diameter flat grate with small square or short-slotted drainage openings.

1. Grate Free Area: Approximately 50 percent unless otherwise indicated.

G. NYCDPR Type C-2 Catch basin Parks leaf catch basin cover and frames: The catch basin covers must be ductile iron ASTM A-536, latest revision, Grade 65-48-12 or better. . All covers ust be suitable for highway traffic, meeting the requirements for heavy duty H-20 loading, per AASHTO M306-10.

1. Bolt and key: Each cover must be furnished with two (2) locking bolts. Two (2) keys must be furnished per site.

2.8 STORMWATER INLETS

A. Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions in accordance with utility standards. Include heavy-duty frames and grates.

2.9 STORMWATER DETENTION STRUCTURES

A. The contractor must furnish and install a Precast Detention Tank, solid wall ring type, of the sizes and locations shown, in accordance with the plans, specifications and directions of the Commissioner.

B. The precast concrete detention tank must be in accordance with ASTM C913 "Standard specification for precast concrete water and wastewater structures".

C. Bottom slab: The reinforced concrete bottom slab must be of the dimensions and thickness shown on the drawings.

D. Top slab: must be 12" thich reinforced concrete and must be "TRAFFIC" type. Top slab must be of dimensions shown on the drawings and must have one (1) access hatch in the location shown on the plans.

E. Ladder rungs must be constructed of copolymer polypropylene plastic manhole steps.

F. Waterproofing: The detention tank must have internal waterproofing, provided by the precast manufacturer and is subject to approval by the Commissioner.

G. All detention tank items must be submitted for review and approval prior to manufacture.

PART 3 - EXECUTION

3.1 EXECUTION REQUIREMENTS

A. Refer to DDC General Conditions for execution requirements.

3.2 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.3 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

F. Install gravity-flow, nonpressure drainage piping in accordance with the following:

1. |Install ductile-iron piping and special fittings in accordance with AWWA C600 or AWWA M41.
2. Install PE corrugated sewer piping in accordance with ASTM D2321.

3.4 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure drainage piping in accordance with the following:

1. Join ductile-iron piping and special fittings in accordance with AWWA C600 or AWWA M41.
2. Join corrugated-PE piping in accordance with ASTM D3212 for push-on joints.
3. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.5 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use ductile-iron soil pipe fittings in sewer pipes at branches for cleanouts and ductile-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
2. Use Medium-Duty, top-loading classification cleanoutsin paved foot traffic areas
3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.

B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.

3.6 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections with sealants in accordance with ASTM C891.

C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.

D. Set frames and grates to the elevations indicated. Frames must be adjusted to the final grades by the use of cement mortar or brick masonry set in cement mortar as directed by the Commissioner.

3.7 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated. Frames must be adjusted to the final grades by the use of cement mortar or brick masonry set in cement mortar as directed by the Commissioner.

3.8 STORMWATER INLET AND OUTLET INSTALLATION

A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.

B. Construct riprap of broken stone, as indicated.

C. Install outlets that spill onto grade, anchored with concrete, where indicated.

D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

E. Construct energy dissipaters at outlets, as indicated.

3.9 CONNECTIONS

A. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

    a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
    b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

B. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.

    a. Unshielded flexible couplings for same or minor difference OD pipes.
    b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
    c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

2. Use pressure-type pipe couplings for force-main joints.

3.10 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:

1. Close open ends of piping with at least 8- inch- thick, brick masonry bulkheads.
2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:

1. Remove manhole or structure and close open ends of remaining piping.
2. Remove top of manhole or structure down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.

C. Backfill to grade in accordance with Section 312000 "Earth Moving."

3.11 IDENTIFICATION

A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

1. Use warning tape or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.12 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe is visible between structures.
b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
d. Infiltration: Water leakage into piping.
e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems in accordance with requirements of the NYCDEP.
3. Schedule tests and inspections by the NYCDEP with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Gravity-Flow Storm Drainage Piping: Test in accordance with requirements of UNI-B-6, and the following:

a. Exception: Piping with soiltight joints unless required by the NYCDEP.
b. Option: Test plastic piping in accordance with ASTM F1417.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.13 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION 334200

FMS ID: **P-1TRERE C**

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

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

Department of Design and Construction

Contract for Furnishing all Labor and Material Necessary and Required for:

CONTRACT NO. 1 GENERAL CONSTRUCTION WORK

Walter Gladwin Recreation Center

LOCATION: **550 East Tremont Avenue**
BOROUGH: **Bronx, NY 10457**
CITY OF NEW YORK

Contractor

Dated _____ , 20 _____

Entered in the Comptroller's Office

First Assistant Bookkeeper

Dated _____ , 20 _____